

PROJECT MANUAL

College of Alameda

Transportation Technology

Peralta Community College District
333 E. 8th Street
Oakland, CA 94606

DSA File No. 1-C1
DSA Application Number:
01-119478

Prepared By:
JK Architecture Engineering
Project No. 20-175

TABLE OF CONTENTS**Procurement and Contracting Requirements**

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 01 01	Project Title Page
	00 01 10	Table of Contents
	00 01 15	List of Drawings and Tables
	00 01 20	List of Schedules

Solicitation

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 11 16	Notice to Bidders

Instructions for Procurement

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 21 13	Instructions to Bidders
	00 21 13.1	Bidder Information and Forms

Available Information

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 31 19	Existing Conditions
	00 31 32	Geotechnical Data

Procurement Forms and Supplements

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 41 13	Bid Form and Proposal
	00 43 13	Bid Bond
	00 43 36	Designated Subcontractors List
	00 45 01	Site Visit Certification
	00 45 19	Non-Collusion Declaration
	00 45 19.01	Iran Contracting Act Certification
	00 45 26	Workers' Compensation Certification
	00 45 46.01	Prevailing Wage and Related Labor Requirements Certification
	00 45 46.02	Disabled Veteran Business Enterprise Participation Certification
	00 45 46.03	Drug-Free Workplace Certification
	00 45 46.04	Tobacco-Free Environment Certification
	00 45 46.05	Hazardous Materials Certification
	00 45 46.06	Lead-Based Materials Certification
	00 45 46.07	Imported Materials Certification
	00 45 46.08	Sex Offender Registration Act Certification
	00 45 46.09	Buy American Certification
	00 45 46.10	Roofing Project Certification
	00 45 49	Registered Subcontractors List

00 45 90 Post Bid Interview

Contracting Forms and Supplements

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 51 00	Notice of Award
	00 52 13	Agreement Form – Stipulated Sum (Single-Prime Contract)
	00 55 00	Notice to Proceed
	00 56 00	Escrow Bid Documentation
	00 57 00	Escrow Agreement in Lieu of Retention

Project Forms

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 61 13.13	Performance Bond
	00 61 13.16	Payment Bond
	00 63 40	Allowance Expenditure Directive Form
	00 63 57	Proposed Change Order Form
	00 63 63	Change Order Form
	00 65 19.26	Agreement and Release of Any and All Claims
	00 65 36	Guarantee Form

Conditions of the Contract

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 72 13	General Conditions – Stipulated Sum (Single-Prime Contract)
	00 73 13	Special Conditions
	00 73 56	Hazardous Materials Procedures and Requirements

General Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 11 00	Summary of Work

Price and Payment Procedures

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 21 00	Allowance
	01 22 00	Unit Prices
	01 25 13	Product Options and Substitutions
	01 26 00	Changes in the Work
	01 29 00	Application for Payment and Conditional and Unconditional Waiver and Release Forms

Administrative Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 31 19	Project Meetings
	01 32 13	Scheduling of Work
	01 33 00	Submittals
	01 35 13.23	Site Standards

Quality Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 41 00	Regulatory Requirements
	01 42 13	Abbreviations and Acronyms
	01 42 16	Definitions
	01 42 19	References
	01 43 00	Materials and Equipment
	01 45 00	Quality Control

Temporary Facilities and Controls

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 50 00	Temporary Facilities and Controls
	01 50 13	Construction Waste Management and Disposal
	01 52 13	Field Offices

Product Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 64 00	Owner-Furnished Products
	01 66 00	Product Delivery, Storage and Handling

Execution and Closeout Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 71 23	Field Engineering
	01 73 29	Cutting and Patching
	01 76 00	Alteration Project Procedures
	01 77 00	Contract Closeout and Final Cleaning
	01 78 23	Operation and Maintenance Data
	01 78 36	Warranties
	01 78 39	Record Documents

Life Cycle Activities

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 91 00	Commissioning

EXISTING CONDITIONS

<u>Division 2</u>	<u>Section</u>	<u>Title</u>
	02 41 00	Selective Demolition
	02 41 16	Structure Demolition

CONCRETE

<u>Division 3</u>	<u>Section</u>	<u>Title</u>
	03 10 00	Concrete Formwork
	03 21 00	Reinforcing Steel
	03 30 00	Cast-In-Place Concrete
	03 62 13	Non-Metallic Non-Shrink Grouting

MASONRY

<u>Division 4</u>	<u>Section</u>	<u>Title</u>
	04 05 00	Mortar and Grout
	04 22 00	Concrete Unit Masonry

METALS

<u>Division 5</u>	<u>Section</u>	<u>Title</u>
	05 12 00	Structural Steel
	05 12 13	Architecturally Exposed Structural Steel
	05 30 00	Metal Decking
	05 34 00	Acoustical Metal Decking
	05 40 00	Cold Formed Metal Framing
	05 50 00	Metal Fabrications
	05 51 13	Metal Pan Stairs
	05 51 33	Aluminum Ladders
	05 55 16	Metal Stair Nosing's

WOOD, PLASTICS AND COMPOSITES

<u>Division 6</u>	<u>Section</u>	<u>Title</u>
	06 16 43	Exterior Gypsum Sheathing
	06 20 23	Interior Finish Carpentry
	06 41 00	Architectural Wood Casework
	06 61 16	Solid Surfacing Fabrications

THERMAL AND MOISTURE PROTECTION

<u>Division 7</u>	<u>Section</u>	<u>Title</u>
	07 13 26	Self-Adhering Sheet Waterproofing
	07 19 00	Water Repellants
	07 21 10	Thermal and Acoustical Insulation
	07 22 00	Roof and Deck Insulation
	07 25 00	Water Resistive Barrier System
	07 26 16	Below-Grade Vapor Retarders
	07 42 13	Metal-Wall-Panels
	07 42 13.16	Metal Plate Wall Panels
	07 54 19	Polyvinyl-Chloride (PVC) Roofing
	07 62 00	Sheet Metal Flashing and Trim
	07 72 00	Roof Accessories
	07 84 13	Penetration Firestopping
	07 92 00	Joint Protection

OPENINGS

<u>Division 8</u>	<u>Section</u>	<u>Title</u>
	08 11 13	Hollow Metal Doors and Frames
	08 31 13	Access Doors and Frames
	08 33 00	Rolling Service Door
	08 33 20	Rolling Counter Door
	08 36 00	Sectional Doors

08 41 13	Aluminum-Framed Storefronts, Entrances & Windows
08 62 00	Unit Skylights
08 71 00	Door Hardware
08 81 00	Glass Glazing
08 90 00	Louvers and Vents

FINISHES

<u>Division 9</u>	<u>Section</u>	<u>Title</u>
	09 21 16	Gypsum Board
	09 22 36	Cement Plaster Lathing and Lath Accessories
	09 24 00	Portland Cement Plastering
	09 28 13	Cementitious Backing Boards
	09 30 13	Ceramic Tiling
	09 51 00	Acoustical Ceilings
	09 60 10	Concrete Slab Moisture Control Coating
	09 61 43	Water Vapor Emission Testing
	09 65 00	Resilient Flooring
	09 65 13	Resilient Base and Transition Strips
	09 68 13	Tile Carpeting
	09 70 00	Vinyl-Coated Fabric Wall Coverings
	09 78 26	Fiberglass Reinforced Wall Panels
	09 91 00	Painting – Interior and Exterior
	09 96 23	Graffiti-Resistant Coatings

SPECIALTIES

<u>Division 10</u>	<u>Section</u>	<u>Title</u>
	10 11 16	Markerboards
	10 14 00	Signage
	10 14 19	Dimensional Letter Signage
	10 21 13.16	Plastic Laminate-Clad Toilet Compartment
	10 26 13	Corner Guards and Wall Protection
	10 28 13	Toilet Accessories
	10 28 40	Electric Hand Dryers
	10 41 00	Emergency Access and Information Cabinets
	10 44 13	Fire Protection Cabinets
	10 51 13	Metal Lockers

EQUIPMENT

<u>Division 11</u>	<u>Section</u>	<u>Title</u>
	11 11 43	Relocation of Existing Industrial Shop Equipment
	11 14 60	Fluid Dispensing System
	11 24 19	Vacuum Equipment

FURNISHINGS

<u>Division 12</u>	<u>Section</u>	<u>Title</u>
	12 24 00	Roller Shade
	12 36 00	Stainless Steel Countertop
	12 48 13	Entrance Floor Mats and Frames
	12 93 00	Site Furnishings

SPECIAL CONSTRUCTION

<u>Division 13</u>	<u>Section</u>	<u>Title</u>
NOT USED		

CONVEYING EQUIPMENT

<u>Division 14</u>	<u>Section</u>	<u>Title</u>
	14 42 16	Vertical Wheelchair Lifts
	14 45 00	Vehicle Lifts

FIRE SUPPRESSION

<u>Division 21</u>	<u>Section</u>	<u>Title</u>
	21 05 00	Common Work Results for Fire Suppression
	21 05 23	General-Duty Valves for Water-Based Fire-Suppression Piping
	21 05 53	Identification for Fire Suppression Piping and Equipment
	21 07 19	Fire Suppression Piping Insulation
	21 13 00	Fire-Suppression Sprinkler Systems

PLUMBING

<u>Division 22</u>	<u>Section</u>	<u>Title</u>
	22 05 10	Plumbing General Provisions
	22 05 16	Expansion Fittings and Loops for Plumbing Piping
	22 05 23	General-Duty Valves for Plumbing
	22 05 29	Hangers and Supports for Plumbing Piping and Equipment
	22 05 53	Identification for Plumbing Piping and Equipment
	22 07 19	Plumbing Piping Insulation
	22 08 00	Plumbing Commissioning Requirements
	22 10 05	Plumbing Piping
	22 10 06	Plumbing Piping Specialties
	22 15 00	General-Service Compressed-Air Systems
	22 30 00	Plumbing Equipment
	22 40 00	Plumbing Fixtures

HEATING, VENTILATING AND AIR CONDITIONING

<u>Division 23</u>	<u>Section</u>	<u>Title</u>
	23 05 10	Mechanical General Provisions
	23 05 29	Hangers and Support for HVAC Piping and Equipment
	23 05 53	Identification for HVAC Piping and Equipment
	23 05 93	Testing, Adjusting, and Balancing for HVAC

23 07 13	Duct Insulation
23 07 19	HVAC Piping Insulation
23 08 00	Mechanical Commissioning Requirements
23 09 24	Direct-Digital Control System for HVAC
23 23 00	Refrigerant Piping
23 31 00	HVAC Ducts and Casings
23 33 00	Air Duct Accessories
23 34 23	HVAC Power Ventilators
23 35 16	Engine Exhaust System
23 37 00	Air Outlets and Inlets
23 74 13	Packaged Outdoor Central-Station Air-Handling Units
23 81 26.13	Small-Capacity Split-System Air Conditioners

ELECTRICAL

<u>Division 26</u>	<u>Section</u>	<u>Title</u>
	26 01 10	General Requirements Electrical
	26 02 10	Electrical Demolition General Requirements
	26 05 19	Low-Voltage Electrical Power Conductors and Cables (600 V and Less)
	26 05 26	Grounding and Bonding for Electrical Systems
	26 05 29	Hangers and Supports for Electrical Systems
	26 05 30	Rooftop Conduit Support for Electrical Systems
	26 05 34	Raceway
	26 05 37	Boxes
	26 05 53	Identification for Electrical Systems
	26 08 00	Electrical Commissioning Requirements
	26 09 16	Controls and Relays
	26 09 23	Lighting Control Devices
	26 22 10	Dry-Type Transformers
	26 24 13	Switchboard and Distribution Panel
	26 24 16	Panelboards
	26 27 16	Electrical Cabinets and Enclosures
	26 27 17	Equipment Wiring
	26 27 26	Wiring Devices
	26 28 13	Fuses
	26 28 16	Disconnects
	26 29 23	Motor Starters
	26 42 00	Cathodic Protection
	26 51 00	Interior Lighting
	26 56 00	Exterior Lighting

COMMUNICATIONS

<u>Division 27</u>	<u>Section</u>	<u>Title</u>
	27 05 00	Common Work Results for Communications
	27 10 05	Structured Cabling for Voice and Data – Inside Plant
	27 15 00	Communications Horizontal Cabling
	27 30 10	Assistive Listening System
	27 41 00	Audio Visual Systems

27 51 17 Public Address Systems

ELECTRONIC SAFETY AND SECURITY

<u>Division 28</u>	<u>Section</u>	<u>Title</u>
	28 13 00	Access Control
	28 16 00	Intrusion Detection
	28 23 00	Video Surveillance
	28 31 11	Digital, Addressable Fire Alarm System

EARTHWORK

<u>Division 31</u>	<u>Section</u>	<u>Title</u>
	31 10 00	Site Clearing
	31 20 00	Earth Moving
	31 22 19	Finish Grading
	31 22 19.13	Landscape Grading
	31 23 33	Trenching and Backfilling
	31 62 13.23	Prestressed Concrete Piles

EXTERIOR IMPROVEMENTS

<u>Division 32</u>	<u>Section</u>	<u>Title</u>
	32 11 23	Aggregate Base Courses
	32 12 16	Asphalt Paving
	32 13 13	Concrete Paving
	32 17 23	Pavement Markings
	32 31 13	Chain Link Fences and Gates
	32 31 19	Decorative Metal Fences and Gates
	32 84 00	Planting Irrigation
	32 90 00	Planting

UTILITIES

<u>Division 33</u>	<u>Section</u>	<u>Title</u>
	33 05 13	Manholes and Structures
	33 05 26	Utility Line, Signs, Markers, and Flags
	33 08 00	Commissioning of Utilities
	33 08 10	Commissioning of Water Utilities
	33 08 30	Commissioning of Sanitary Sewer Utilities
	33 11 00	Water Utility Distribution Piping
	33 11 19	Fire Suppression Utility Water Distribution Piping
	33 12 13.13	Water Supply Backflow Prevention Assemblies
	33 12 16	Water Distribution Valves
	33 12 19	Fire Hydrants
	33 12 33	Water Utility Metering
	33 13 00	Disinfection of Domestic Water Piping
	33 31 00	Sanitary Utility Sewerage Piping
	33 39 23	Sanitary Utility Sewerage Cleanout

DIVISION 44

33 41 00
41 22 00

Storm Utility Drainage Piping
Cranes and Hoists

APPENDIX 01

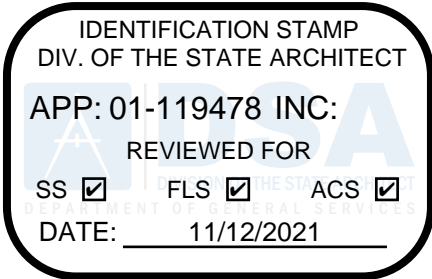
Abatement Specifications Building B Demolition Project

APPENDIX 02

Equipment Furnishings

APPENDIX 03

END OF TABLE OF CONTENTS



PROJECT MANUAL

For

Peralta Community College District

333 E 8th Street

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Stamp and Signature Page

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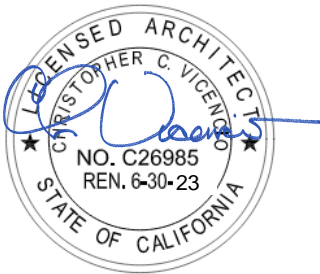
11661 Blocker Drive, Suite 220

Auburn, CA 95603

5/5/2021

DSA File No.: 1-C1

DSA Application Number: 01-119478



Architect



Structural



Mechanical



Electrical

[BID]/[PROJECT] MANUAL

PROJECT/CONTRACT NUMBER: _____

TRANSPORTATION TECHNOLOGY

PERALTA

COMMUNITY COLLEGE DISTRICT

MAY 5, 2021

TABLE OF CONTENTS**Procurement and Contracting Requirements**

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 01 01	Project Title Page
	00 01 10	Table of Contents
	00 01 15	List of Drawings and Tables
	00 01 20	List of Schedules

Solicitation

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 11 16	Notice to Bidders

Instructions for Procurement

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 21 13	Instructions to Bidders
	00 21 13.1	Bidder Information and Forms

Available Information

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 31 19	Existing Conditions
	00 31 32	Geotechnical Data

Procurement Forms and Supplements

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 41 13	Bid Form and Proposal
	00 43 13	Bid Bond
	00 43 36	Designated Subcontractors List
	00 45 01	Site Visit Certification
	00 45 19	Non-Collusion Declaration
	00 45 19.01	Iran Contracting Act Certification
	00 45 26	Workers' Compensation Certification
	00 45 46.01	Prevailing Wage and Related Labor Requirements Certification
	00 45 46.02	Disabled Veteran Business Enterprise Participation Certification
	00 45 46.03	Drug-Free Workplace Certification
	00 45 46.04	Tobacco-Free Environment Certification
	00 45 46.05	Hazardous Materials Certification
	00 45 46.06	Lead-Based Materials Certification
	00 45 46.07	Imported Materials Certification
	00 45 46.08	Sex Offender Registration Act Certification
	00 45 46.09	Buy American Certification
	00 45 46.10	Roofing Project Certification
	00 45 49	Registered Subcontractors List
	00 45 90	Post Bid Interview

Contracting Forms and Supplements

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 51 00	Notice of Award
	00 52 13	Agreement Form – Stipulated Sum (Single-Prime Contract)
	00 55 00	Notice to Proceed
	00 56 00	Escrow Bid Documentation
	00 57 00	Escrow Agreement in Lieu of Retention

Project Forms

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 61 13.13	Performance Bond
	00 61 13.16	Payment Bond
	00 63 40	Allowance Expenditure Directive Form
	00 63 57	Proposed Change Order Form
	00 63 63	Change Order Form
	00 65 19.26	Agreement and Release of Any and All Claims
	00 65 36	Guarantee Form

Conditions of the Contract

<u>Division 0</u>	<u>Section</u>	<u>Title</u>
	00 72 13	General Conditions – Stipulated Sum (Single-Prime Contract)
	00 73 13	Special Conditions
	00 73 56	Hazardous Materials Procedures and Requirements

General Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 11 00	Summary of Work

Price and Payment Procedures

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 21 00	Allowance
	01 22 00	Unit Prices
	01 25 13	Product Options and Substitutions
	01 26 00	Changes in the Work
	01 29 00	Application for Payment and Conditional and Unconditional Waiver and Release Forms

Administrative Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 31 19	Project Meetings
	01 32 13	Scheduling of Work
	01 33 00	Submittals
	01 35 13.23	Site Standards

Quality Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 41 00	Regulatory Requirements
	01 42 13	Abbreviations and Acronyms
	01 42 16	Definitions
	01 42 19	References
	01 43 00	Materials and Equipment
	01 45 00	Quality Control

Temporary Facilities and Controls

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 50 00	Temporary Facilities and Controls
	01 50 13	Construction Waste Management and Disposal
	01 52 13	Field Offices

Product Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 64 00	Owner-Furnished Products
	01 66 00	Product Delivery, Storage and Handling

Execution and Closeout Requirements

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 71 23	Field Engineering
	01 73 29	Cutting and Patching
	01 76 00	Alteration Project Procedures
	01 77 00	Contract Closeout and Final Cleaning
	01 78 23	Operation and Maintenance Data
	01 78 36	Warranties
	01 78 39	Record Documents

Life Cycle Activities

<u>Division 1</u>	<u>Section</u>	<u>Title</u>
	01 91 00	Commissioning

LIST OF DRAWINGS AND TABLES

DRAWINGS

Sheet number

File number

Description

GENERAL
G0.0.0 COVER SHEET
G0.1.0 INDEX, ABBREVIATION, LEGENDS AND SYMBOLS
G0.4.0 GREEN BUILDING CODE REQUIREMENTS
G1.1.0 SITE & BLDG. SHELL CODE ANALYSIS
G2.1.0 EXITING ANALYSIS
G3.1.0 ACCESSIBILITY REQUIREMENTS
G3.2.0 ACCESSIBILITY REQUIREMENTS
G3.3.0 ACCESSIBILITY NOTES
G3.4.0 ACCESSIBILITY NOTES
G4.1.0 SIGNAGE PLAN
G4.2.1 SIGNAGE DETAILS

A7.3.1 OPENING DETAILS
A7.3.2 OPENING DETAILS
A8.1.1 INTERIOR FINISHES PLAN & SCHEDULE
A8.1.2 ENLARGED CASEWORK PLANS AND ELEVATIONS
A8.2.1 INTERIOR ELEVATIONS
A8.2.2 INTERIOR ELEVATIONS
A8.2.3 INTERIOR ELEVATIONS
A8.2.4 INTERIOR ELEVATIONS
A8.2.5 INTERIOR ELEVATIONS
A8.3.1 INTERIOR DETAILS
A8.3.2 INTERIOR DETAILS
A8.3.3 INTERIOR DETAILS
A8.4.1 INTERIOR EQUIP DETAILS
A8.6.1 VERTICAL CIRCULATION
A8.6.2 VERTICAL CIRCULATION
A8.6.3 STAIR, HANDRAIL, & LIFT DETAILS
A8.1.3 DIMENSIONAL LETTER SIGNAGE

STRUCTURAL
S1.0.0 STRUCTURAL COVER SHEET
S1.0.1 GENERAL NOTES
S1.0.2 GENERAL NOTES
S1.1.1 STRUCTURAL SPECIAL INSPECTIONS & TESTING
S1.1.2 STRUCTURAL SPECIAL INSPECTIONS & TESTING
S2.1.0 GRADING PLAN
S2.1.1 FOUNDATION PLAN - WEST
S2.1.2 FOUNDATION PLAN - CENTRAL
S2.1.3 FOUNDATION PLAN - EAST
S2.2.0 MEZZANINE FRAMING PLANS
S2.3.0 ROOF FRAMING AND DECK FRAMING PLAN - OVERALL
S2.3.1 ROOF FRAMING PLAN - WEST
S2.3.2 FOUNDATION PLAN - CENTRAL
S2.3.3 FOUNDATION PLAN - EAST
S2.4.1 ENLARGED CANOPY FRAMING PLANS
S3.1.1 SECTIONS
S3.1.2 SECTIONS
S3.1.3 SECTIONS

T24.04 TITLE 24 CALCULATIONS
PLUMBING
P0.1 PLUMBING NOTES, LEGENDS, & SPECIFICATIONS
P0.2 PLUMBING SCHEDULES
P0.3 PLUMBING DETAILS
P0.4 PLUMBING DETAILS
P1.0.1 PLUMBING SITE PLAN
P2.1.1 PLUMBING FLOOR PLAN
P2.3.1 PLUMBING FLOOR PLAN - WEST BUILDING WASTE AND VENT
P2.3.2 PLUMBING FLOOR PLAN - WEST BUILDING WATER AND GAS
P2.3.3 PLUMBING FLOOR PLAN - CENTER BUILDING WASTE AND VENT
P2.3.4 PLUMBING FLOOR PLAN - CENTER BUILDING WATER AND GAS
P2.3.5 PLUMBING FLOOR PLAN - EAST BUILDING WASTE AND VENT
P2.3.6 PLUMBING FLOOR PLAN - EAST BUILDING WATER AND GAS
P3.1.1 PLUMBING ENLARGED PLAN
P4.1.1 PLUMBING ROOF PLAN
P5.1.1 PLUMBING ISOMETRICS - WATER AND GAS
P5.1.2 PLUMBING ISOMETRICS - WASTE AND VENT
P5.1.3 PLUMBING ISOMETRICS - COMPRESSED AIR
P6.1.1 PLUMBING SECTIONS
P6.1.2 PLUMBING SECTIONS

ELECTRICAL
E0.1 ELECTRICAL ABBREVIATIONS, NOTES, & SHEET INDEX
E0.2 ELECTRICAL SYMBOL LEGEND
E0.3 ELECTRICAL SCHEDULES
E0.4 ELECTRICAL PANEL SCHEDULES
E0.5 ELECTRICAL PANEL SCHEDULES
E0.6 ELECTRICAL PANEL SCHEDULES
E0.7 ELECTRICAL DETAILS
E0.8 ELECTRICAL DETAILS
E0.9 ELECTRICAL ONE LINE DIAGRAM
E1.0.1 ELECTRICAL SITE PLAN
E1.0.2 SITE PHOTOMETRIC PLAN
E2.1.1 LIGHTING OVERALL PLAN
E2.1.2 LIGHTING PLAN - WEST BUILDING
E2.1.3 LIGHTING PLAN - CENTER BUILDING
E2.1.4 LIGHTING PLAN - EAST BUILDING
E2.2.1 ELECTRICAL FLOOR OVERALL PLAN
E2.3.1 ELECTRICAL FLOOR PLAN - WEST BUILDING
E2.3.2 ELECTRICAL FLOOR PLAN - CENTER BUILDING
E2.3.3 ELECTRICAL FLOOR PLAN - EAST BUILDING
E4.1.1 ELECTRICAL ROOF PLAN

CIVIL
C1.0 FIRE ACCESS PLAN
C1.1 SITE ACCESSIBILITY PLAN
C2.0 TOPOGRAPHIC MAP I
C2.1 TOPOGRAPHIC MAP II
C3.0 SITE SURFACE DEMOLITION PLAN I
C3.1 SITE SURFACE DEMOLITION PLAN II
C3.2 UTILITY AND TREE DEMOLITION PLAN I
C3.3 UTILITY AND TREE DEMOLITION PLAN II
C4.0 PAVING PLAN I
C4.1 PAVING PLAN II
C5.0 GRADING PLAN
C5.1 GRADING AND DRAINAGE DETAILS
C6.0 UTILITY PLAN
C7.0 CONSTRUCTION DETAILS I
C7.1 CONSTRUCTION DETAILS II
C7.2 CONSTRUCTION DETAILS III
C7.3 CONSTRUCTION DETAILS IV
C8.0 EROSION CONTROL PLAN

LANDSCAPE
L1.0 IRRIGATION PLAN
L1.1 IRRIGATION LEGEND AND NOTES
L1.2 HYDROZONE PLAN

L2.0 TREE PLAN
L2.1 SHRUB AND GROUND COVER PLAN
L2.2 PLANTING LEGEND AND NOTES
L3.0 LANDSCAPE DETAILS I
L3.1 LANDSCAPE DETAILS II

SITE - ARCHITECTURAL
A1.0.0 OVERALL CAMPUS SITE PLAN
A1.0.1 ENLARGED SITE PLAN
A1.1.0 FENCE & TRASH ENCLOSURE ELEVATIONS
A1.2.1 SITE DETAILS
A1.2.2 SITE DETAILS
A1.2.3 SITE DETAILS
A1.2.4 SITE DETAILS

ARCHITECTURAL
A2.1.1 FLOOR PLAN - OVERALL
A2.1.3 SLAB GRAPHIC KEY PLAN
A2.2.1 WEST FLOOR PLAN - ANNOTATION
A2.2.2 CENTRAL FLOOR PLAN - ANNOTATION
A2.2.3 EAST FLOOR PLAN - ANNOTATION
A2.3.1 WEST FLOOR PLAN - DIMENSIONING
A2.3.2 CENTRAL FLOOR PLAN - DIMENSIONING
A2.3.3 EAST FLOOR PLAN - DIMENSIONING
A2.4.1 ENLARGED RESTROOM PLANS AND INTERIORS
A2.4.2 ENLARGED RESTROOM PLANS AND INTERIORS
A2.5.1 CLERESTORY AND MEZZANINE PLAN
A2.6.1 WALL TYPES
A2.6.2 WALL TYPES
A2.6.3 TESTED ASSEMBLIES
A2.6.4 TESTED ASSEMBLIES
A2.6.5 TESTED ASSEMBLIES
A2.7.1 WALL TYPE DETAILS
A2.7.2 WALL TYPE DETAILS
A3.1.1 REFLECTED CEILING PLAN - OVERALL
A3.1.2 WEST REFLECTED CEILING PLAN
A3.2.2 CENTRAL REFLECTED CEILING PLAN
A3.2.3 EAST REFLECTED CEILING PLAN

A3.3.1 CEILING DETAILS - ACT
A3.3.2 CEILING DETAILS
A4.1.1 ROOF PLAN - OVERALL
A4.2.1 WEST ROOF PLAN
A4.2.2 CENTRAL ROOF PLAN
A4.2.3 EAST ROOF PLAN
A4.2.4 AWNING CANOPY PLANS, ELEVATIONS, ISOMETRICS
A4.2.5 ENTRANCE CANOPY PLAN, ELEVATIONS, ISOMETRICS
A4.4.1 ROOF DETAILS TYPICAL
A4.4.2 ROOF DETAILS TYP. PENETRATIONS
A4.4.3 ROOF DETAILS SPECIFIC
A5.0.1 ISOMETRIC VIEW - REFERENCE ONLY
A5.0.2 ISOMETRIC VIEW - REFERENCE ONLY
A5.1.1 EXTERIOR ELEVATIONS - OVERALL
A5.3.1 BUILDING SECTIONS
A5.3.2 BUILDING SECTIONS
A5.3.3 BUILDING SECTIONS
A6.1.1 WALL SECTIONS
A6.1.2 WALL SECTIONS
A6.1.3 WALL SECTIONS
A6.1.4 WALL SECTIONS
A6.1.5 WALL SECTIONS
A6.2.1 METAL PANEL WALL DETAILS
A6.2.2 CEMENT PLASTER WALL DETAILS
A6.2.3 EXTERIOR DETAILS
A7.1.1 DOOR SCHEDULE & TYPES
A7.1.2 WINDOW AND STOREFRONT SCHED. & TYPES

S3.1.4 SECTIONS
S3.1.5 SECTIONS
S3.1.6 SECTIONS
S3.1.7 SECTIONS - MEZZANINE
S4.0.1 ELEVATIONS
S4.0.2 ELEVATIONS
S4.0.3 ELEVATIONS
S4.0.4 ELEVATIONS
S4.0.5 ELEVATIONS
S5.0.1 TYPICAL CONCRETE DETAILS
S5.0.2 CONCRETE PILES AND PILE CAPS
S5.0.3 CONCRETE SUSPENDED SLABS
S5.0.4 CONCRETE GRADE BEAMS
S5.1.1 TYPICAL CMU DETAILS
S5.1.2 TYPICAL CMU DETAILS
S5.1.3 CMU DETAILS
S5.1.4 CMU DETAILS
S5.1.5 CMU DETAILS
S5.1.6 CMU DETAILS
S5.2.1 TYPICAL STEEL DETAILS
S5.2.2 TYPICAL STEEL DETAILS
S5.2.3 STEEL DETAILS
S5.2.4 STEEL DETAILS
S5.3.1 STEEL DECK DETAILS
S5.3.2 STEEL DECK DETAILS
S6.0.1 TYPICAL METAL STUD EXTERIOR DETAILS
S6.0.2 TYPICAL METAL STUD INTERIOR DETAILS
S6.0.3 TYPICAL METAL STUD COMMON DETAILS
S6.0.4 TYPICAL METAL STUD COMMON DETAILS
S6.1.1 METAL STUD DETAILS
S7.0.1 STAIR DETAILS
S8.0.1 CANOPY DETAILS
S8.0.2 CANOPY DETAILS
S9.0.1 SITE STRUCTURE
S9.0.2 SITE STRUCTURE DETAILS
S9.0.3 SITE STRUCTURE DETAILS
S9.1.1 EQUIPMENT ANCHORAGE DETAILS
S9.1.2 EQUIPMENT ANCHORAGE DETAILS

MECHANICAL
M0.1 MECHANICAL NOTES, LEGENDS, & SPECIFICATIONS
M0.2 MECHANICAL SCHEDULES
M0.3 MECHANICAL SCHEDULES
M0.4 MECHANICAL DETAILS
M0.5 MECHANICAL DETAILS
M1.0.1 MECHANICAL SITE PLAN
M2.1.1 MECHANICAL FLOOR PLAN
M2.3.1 MECHANICAL FLOOR PLAN - WEST BUILDING
M2.3.2 MECHANICAL FLOOR PLAN - CENTER BUILDING
M2.3.3 MECHANICAL FLOOR PLAN - EAST BUILDING
M4.1.1 MECHANICAL ROOF PLAN
M5.1.1 MECHANICAL ISOMETRICS
M6.1.1 MECHANICAL SECTIONS
M6.1.2 MECHANICAL SECTIONS
M7.1.1 MECHANICAL CONTROLS
M7.1.2 MECHANICAL CONTROLS
M7.1.3 MECHANICAL CONTROLS
M7.1.4 MECHANICAL CONTROLS

MECHANICAL
T24.01 TITLE 24 CALCULATIONS
T24.02 TITLE 24 CALCULATIONS
T24.03 TITLE 24 CALCULATIONS

FIRE ALARM
FA0.1 FIRE ALARM NOTES, LEGENDS, & SPECIFICATIONS
FA0.2 FIRE ALARM DETAILS
FA0.3 FIRE ALARM DETAILS
FA0.4 FIRE ALARM WIRING DIAGRAMS
FA0.5 FIRE ALARM CALCULATIONS
FA0.6 FIRE ALARM RISER DIAGRAM
FA1.0.1 FIRE ALARM SITE PLAN
FA2.1.1 FIRE ALARM FLOOR PLAN
FA2.3.1 FIRE ALARM FLOOR PLAN - WEST BUILDING
FA2.3.2 FIRE ALARM FLOOR PLAN - CENTER BUILDING
FA2.3.3 FIRE ALARM FLOOR PLAN - EAST BUILDING
FA3.0.1 FIRE ALARM SECTIONS

FIRE PROTECTION
FP0.1 FIRE PROTECTION NOTES, LEGENDS, & SPECIFICATIONS
FP0.2 FIRE PROTECTION DETAILS
FP0.3 FIRE PROTECTION DETAILS
FP1.0.1 FIRE PROTECTION SITE PLAN
FP2.1.1 FIRE PROTECTION OVERALL FLOOR PLAN
FP2.3.1 FIRE PROTECTION FLOOR PLAN - WEST BUILDING
FP2.3.2 FIRE PROTECTION FLOOR PLAN - CENTER BUILDING
FP2.3.3 FIRE PROTECTION FLOOR PLAN - EAST BUILDING
FP2.4.1 FIRE PROTECTION CEILING PLAN - WEST BUILDING
FP2.4.2 FIRE PROTECTION CEILING PLAN - CENTER BUILDING
FP2.4.3 FIRE PROTECTION CEILING PLAN - EAST BUILDING
FP3.0.1 FIRE PROTECTION SECTIONS
FP4.0.1 FIRE PROTECTION SEISMIC CALCULATIONS
FP4.0.2 FIRE PROTECTION SEISMIC CALCULATIONS

TELECOM
T0.1 LOW VOLTAGE ABBREVIATIONS, NOTES & SHEET INDEX
T0.2 LOW VOLTAGE SYMBOL LEGEND
T1.1.1 LOW VOLTAGE OVERALL PLAN
T1.1.2 LOW VOLTAGE - TELECOMMUNICATION SITE FEED
T2.1.1 LOW VOLTAGE - WEST
T2.1.2 LOW VOLTAGE - CENTER BUILDING
T2.1.3 LOW VOLTAGE - EAST BUILDING
T2.1.4 LOW VOLTAGE - IDF BUILD OUTS
T2.1.5 LOW VOLTAGE - MOUNTING DETAILS
T2.1.6 LOW VOLTAGE - MOUNTING DETAILS
T2.1.7 LOW VOLTAGE - AUDIO VISUAL DETAILS

CATHODIC PROTECTION
CP-1 CATHODIC PROTECTION SITE PLAN, KEY & NOTES
CP-2 CATHODIC PROTECTION DETAILS 1
CP-3 CATHODIC PROTECTION DETAILS 2
CP-4 CATHODIC PROTECTION DETAILS 3
CP-5 CATHODIC PROTECTION SPECIFICATIONS

AUTOMOTIVE EQUIPMENT
EQ-0 EQUIPMENT INDEX
EQ-1.0 OVERALL FLOOR PLAN
EQ-1.1 AUTOMOTIVE DIMENSIONING
EQ-1.2 PAINT AUTO BODY LAB DIMENSIONING
EQ-1.3 DIESEL TECHNOLOGY LAB DIMENSIONING
EQ-1.4 EQUIPMENT LOCATION BUILDING "B"
EQ-1.5 EQUIPMENT LOCATION BUILDING "E"

EQUIPMENT FURNISHING - REFERENCE ONLY
EF 1 EQUIPMENT FURNISHING OVERALL PLAN

PAINT BOOTHS - REFERENCE ONLY
PB1.0.0 PAINT BOOTH PERFORMANCE CRITERIA
PB1.1.0 PAINT BOOTHS

TOTAL SHEETS : 279

DOCUMENT 00 11 16

NOTICE TO BIDDERS

1. Notice is hereby given that the governing board ("Board") of the Peralta Community College District ("District") will receive sealed bids for the following project, Bid No. _____, Bid Package _____ ("Project" or "Contract"):

2. The Project consists of:

_Demolition and removal of two existing facilities and the construction of a New Transportation Technology Center

3. To bid on this Project, the Bidder is required to possess one or more of the following State of California contractor license(s):

A, B, and/or C-__

The Bidder's license(s) must remain active and in good standing throughout the term of the Contract.

4. To bid on this Project, the Bidder is required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code.

5. Contract Documents will be available on or after _____, 20__, for review at the District Facilities Office, and may be downloaded from the District's website, www.XXXXXXXXXX.XXX, using the **["Facilities Project and Information"]** link. In addition, Contract Documents are available for bidders' review at the following builders' exchanges:

- A. Builder's Exchange of _____ County (____) ____ - _____
- B. A list of these builders' exchanges is available at the District's Facilities Office.

6. Contract Documents are also available for purchase for _____ dollars (\$_____) at the District Facilities Office. This fee is refundable if the Contract Documents are returned in clean condition back to the District Facilities Office no later than ten (10) calendar days after the date of the bid opening.

7. Sealed Bids will be received until _____ a.m./p.m., _____, 20__, at the District Facilities Office, 333 East 8th Street, Oakland, California 94606, at or after which time the bids will be opened and publicly read aloud. Any bid that is submitted after this time shall be non-responsive and returned to the bidder. Any claim by a bidder of error in its bid must be made in compliance with section 5100 et seq. of the Public Contract Code.

8. Pursuant to Public Contract Code section 20111.5, only prequalified bidders will be eligible to submit a bid for this Project. Any bid submitted by a bidder who is not prequalified shall be non-responsive and returned unopened to the bidder.

9. All bids shall be on the form provided by the District. Each bid must conform and be responsive to all pertinent Contract Documents, including, but not limited to, the Instructions to Bidders.
10. A bid bond by an admitted surety insurer on the form provided by the District, or a cashier's check or a certified check, drawn to the order of the Peralta Community College District, in the amount of ten percent (10%) of the total bid price, shall accompany the Bid Form and Proposal, as a guarantee that the Bidder will, within seven (7) calendar days after the date of the Notice of Award, enter into a contract with the District for the performance of the services as stipulated in the bid.
11. A mandatory/voluntary pre-bid conference and site visit will be held on _____, _____, 20____, at ____m. at _____, California. All participants are required to sign in front of the _____ Building, _____, California. The site visit is expected to take approximately _____. Failure to attend or tardiness will render bid ineligible.
12. The successful Bidder shall be required to furnish a 100% Performance Bond and a 100% Payment Bond if it is awarded the contract for the Work.
13. The District has elected to provide an owner-controlled or wrap-up insurance program ("OCIP"). The successful Bidder and its subcontractors shall be required to participate in and comply with the OCIP.
14. The successful Bidder may substitute securities for any monies withheld by the District to ensure performance under the Contract, in accordance with the provisions of section 22300 of the Public Contract Code.
15. The successful bidder will be required to certify that it either meets the Disabled Veteran Business Enterprise ("DVBE") goal of three percent (3%) participation or made a good faith effort to solicit DVBE participation in this Contract if it is awarded the contract for the Work.
16. The Contractor and all Subcontractors under the Contractor shall pay all workers on all work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to section 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the District or on the Internet at: <<http://www.dir.ca.gov>>.
17. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and subject to the requirements of Title 8 of the California Code of Regulations. The successful Bidder shall comply with all requirements of Division 2, Part 7, Chapter 1, Articles 1-5 of the Labor Code.
18. The District has entered into a Project Labor Agreement that is applicable to this Project. A copy of the Project Labor Agreement is available for review at the District Facilities Office and may be downloaded from the District's website, www.XXXXXXXXXX.XXX, using the [**"Facilities Projects and Information"**] link. The

successful bidder and all subcontractors will be required to agree to be bound by the Project Labor Agreement.

19. The District's Board has found and determined that the following item(s) shall be used on this Project based on the purpose(s) indicated. (Public Contract Code section 3400(c).) A particular material, product, thing, or service is designated by specific brand or trade name for the following purpose(s):
- (1) In order that a field test or experiment may be made to determine the product's suitability for future use: _____.
 - (2) In order to match other products in use on a particular public improvement either completed or in the course of completion: _____.
 - (3) In order to obtain a necessary item that is only available from one source: _____.
 - (4) In order to respond to an emergency declared by a local agency: _____.
20. This Project is funded in whole or in part with federal funds, and therefore the Contractor shall comply with the Davis-Bacon Act, applicable reporting requirements, and any other applicable requirements for federal funding. This Project is also subject to Buy American requirements.
21. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on:
- A. The base bid amount only.
[OR]
 - B. The base bid amount plus the following alternates:
[AS EXAMPLES ONLY: "all alternates;" or "additive alternate no. 1 only."]
[OR]
 - C. Up to a total Project fund amount [of \$_____] **[OR]** [to be stated before bids are opened], **[THIS AMOUNT NEED NOT BE STATED HERE BUT MUST BE STATED PRIOR TO OPENING ANY BIDS]** including the additive alternates or deductive alternates needed, in the stated order, to be equal to or less than that amount:
[AS EXAMPLES ONLY: "additive alternate no. 1; and deductive alternate no. 3."]
[OR]

- D. Based on a process that conceals the identity of bidders from the District until the bids have been ranked.
22. The Board reserves the right to reject any and all bids and/or waive any irregularity in any bid received. If the District awards the Contract, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

END OF DOCUMENT

DOCUMENT 00 21 13

INSTRUCTIONS TO BIDDERS

Bidders shall follow the instructions in this document, and shall submit all documents, forms, and information required for consideration of a Bid.

Peralta Community College District ("District") will evaluate information submitted by the apparent low Bidder and, if incomplete or unsatisfactory to District, Bidder's bid may be rejected at the sole discretion of District.

1. Bids are requested for a general construction contract, or work described in general, for the following project ("Project" or "Contract"):

2. Bidder and its subcontractors must possess the appropriate State of California contractors' license and must maintain the license throughout the duration of the project. Bidders must also be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code. Bids submitted by a contractor who is not properly licensed or registered shall be deemed nonresponsive and will not be considered.
3. The District has prequalified bidders pursuant to Public Contract Code section 20651.5. Only prequalified bidders will be eligible to submit a bid for this Project. Any bid submitted by a bidder who is not prequalified shall be deemed nonresponsive and will not be considered.
4. District will receive sealed bids from bidders as stipulated in the Notice to Bidders.
 - a. All bids must be sealed in an envelope, marked with the name and address of the Bidder, name of the Project, the Project Number and/or bid number, and time of bid opening.
 - b. Bids must be submitted to the District Office by date and time shown in the Notice to Bidders.
 - c. Bids must contain all documents as required herein.
5. Bidders are advised that on the date that bids are opened, telephones will not be available at the District Offices for use by bidders or their representatives.
6. Bids will be opened at or after the time indicated for receipt of bids.
7. Bidders must submit Bids on the documents titled Bid Form and Proposal, and must submit all other required District forms. Bids not submitted on the District's required forms shall be deemed nonresponsive and shall not be considered. Additional sheets required to fully respond to requested information are permissible.
8. Bidders shall not modify the Bid Form and Proposal or qualify their bids. Bidders shall not submit to the District a re-formatted, re-typed, altered, modified, or

- otherwise recreated version of the Bid Form and Proposal or other District-provided document.
9. Bids shall be clearly written and without erasure or deletions. District reserves the right to reject any bid containing erasures, deletions, or illegible contents.
 10. Bidders must supply all information required by each Bid Document. Bids must be full and complete. District reserves the right in its sole discretion to reject any Bid as non-responsive as a result of any error or omission in the Bid. Bidders must complete and submit all of the following documents with the Bid Form and Proposal:
 - a. Bid Bond on the District's form, or other security.
 - b. Designated Subcontractors List.
 - c. Site Visit Certification, if a site visit was required.
 - d. Non-Collusion Declaration.
 - e. Iran Contracting Act Certification, if contract value is \$1,000,000 or more.
 - f. OCIP Insurance forms.
 11. Bidders must submit with their Bids cash, a cashier's check or a certified check payable to District, or a bid bond by an admitted surety insurer of not less than ten percent (10%) of amount of Base Bid, plus all additive alternates ("Bid Bond"). If Bidder chooses to provide a Bid Bond as security, Bidder must use the required form of corporate surety provided by District. The Surety on Bidder's Bid Bond must be an insurer admitted in the State of California and authorized to issue surety bonds in the State of California. Bids submitted without necessary bid security will be deemed non-responsive and will not be considered.
 12. If Bidder to whom the Contract is awarded fails or neglects to enter into the Contract and submit required bonds, insurance certificates, and all other required documents, within **SEVEN (7)** calendar days after the date of the Notice of Award, District may deposit Bid Bond, cash, cashier's check, or certified check for collection, and proceeds thereof may be retained by District as liquidated damages for failure of Bidder to enter into Contract, in the sole discretion of District. It is agreed that calculation of damages District may suffer as a result of Bidder's failure to enter into the Contract would be extremely difficult and impractical to determine and that the amount of the Bidder's required bid security shall be the agreed and conclusively presumed amount of damages.
 13. Bidders must submit with the Bid the Designated Subcontractors List for those subcontractors who will perform any portion of Work, including labor, rendering of service, or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of total Bid. Failure to submit this list when required by law shall result in bid being deemed nonresponsive and the bid will not be considered.

14. All of the listed subcontractors are required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code.
 - a. An inadvertent error in listing the California contractor license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.
 - b. An inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:
 - (1) The subcontractor is registered prior to the bid opening.
 - (2) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.
 - (3) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.
15. If a mandatory pre-bid conference and site visit ("Site Visit") is required as referenced in the Notice to Bidders, then Bidders must submit the Site-Visit Certification with their Bid. District will transmit to all prospective Bidders of record such Addenda as District in its discretion considers necessary in response to questions arising at the Site Visit. Oral statements shall not be relied upon and will not be binding or legally effective. Addenda issued by the District as a result of the Site Visit, if any, shall constitute the sole and exclusive record and statement of the results of the Site Visit.
16. Bidders shall submit the Non-Collusion Declaration with their Bids. Bids submitted without the Non-Collusion Declaration shall be deemed non-responsive and will not be considered.
17. The Contractor and all Subcontractors under the Contractor shall pay all workers on all work performed pursuant to the Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the Department of Industrial Relations, are available upon request at the District's principal office. Prevailing wage rates are also available on the internet at <http://www.dir.ca.gov>.

Since the Project is funded in whole or in part with federal funds, the Contractor and all Subcontractors under the Contractor shall comply with the Davis-Bacon Act, applicable reporting requirements, and any other applicable requirements for federal funding. If a conflict exists with a state requirement, the more stringent provision shall control.

18. The District has entered into a Project Labor Agreement that is applicable to this Project. A copy of the Project Labor Agreement is available for review at the District Facilities Office and may be downloaded from the District's website, www.XXXXX.XXX, using the [**"Facilities Projects and Information"**] link. The successful bidder and all subcontractors will be required to agree to be bound by the Project Labor Agreement.
19. Pursuant to Education Code section 81454, the District is requiring the Bidder to purchase and to remove from the school grounds all old materials required by the specifications to be removed from any existing school building on the same school grounds and not required for school purposes and to state in his or her bid the amount which he or she will deduct from the price bid for the work as the purchase price of the old materials. The board shall let the contract to any responsible bidder whose net bid is the lowest, or shall reject all bids.
20. The District has elected to provide an owner-controlled or wrap-up insurance program ("OCIP"). The policy limits, known exclusions, and the length of time the policy is intended to remain in effect provided by the OCIP are described in the OCIP Manual. The District will require all bidders at a minimum to [have no serious and willful violations of Labor Code section 6300 et seq., have a workers' compensation experience modification factor of 1.00 or less, and have an injury prevention program instituted pursuant to Labor Code sections 3201.5 or 6401.7.
21. Pursuant to Education Code section 71028 and Public Contract Code section 10115, the District has a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended each year on District projects. In order to meet this requirement by demonstrating a good faith effort, Bidder must advertise for DVBE-certified subcontractors and suppliers before submitting its Bid. The lowest responsive responsible Bidder awarded the Contract must submit certification of compliance with the procedures for implementation of DVBE contracting goals with its signed Agreement. DVBE Certification form is attached. Do not submit this form with your Bid.
22. Submission of Bid signifies careful examination of Contract Documents and complete understanding of the nature, extent, and location of Work to be performed. Bidders must complete the tasks listed below as a condition to bidding, and submission of a Bid shall constitute the Bidder's express representation to District that Bidder has fully completed the following:
 - a. Bidder has visited the Site, if required, and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, as-built conditions, and all local conditions and federal, state and local laws, and regulations that in any manner may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto;
 - b. Bidder has conducted or obtained and has understood all examinations, investigations, explorations, tests, reports, and studies that pertain to the subsurface conditions, as-built conditions, underground facilities, and all other

physical conditions at or contiguous to the Site or otherwise that may affect the cost, progress, performance, or furnishing of Work, as Bidder considers necessary for the performance or furnishing of Work at the Contract Sum, within the Contract Time, and in accordance with the other terms and conditions of Contract Documents, including specifically the provisions of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies, or similar information or data are or will be required by Bidder for such purposes;

- c. Bidder has correlated its knowledge and the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents;
- d. Bidder has given the District prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and the actual conditions, and the written resolution(s) thereof by the District, is/are acceptable to Bidder;
- e. Bidder has made a complete disclosure in writing to the District of all facts bearing upon any possible interest, direct or indirect, that Bidder believes any representative of the District or other officer or employee of the District presently has or will have in this Contract or in the performance thereof or in any portion of the profits thereof;
- f. Bidder must, prior to bidding, perform the work, investigations, research, and analysis required by this document and that Bidder represented in its Bid Form and Proposal and the Agreement that it performed prior to bidding. Contractor under this Contract is charged with all information and knowledge that a reasonable bidder would ascertain from having performed this required work, investigation, research, and analysis. Bid prices must include entire cost of all work "incidental" to completion of the Work.
- g. Conditions Shown on the Contract Documents: Information as to underground conditions, as-built conditions, or other conditions or obstructions, indicated in the Contract Documents, e.g., on Drawings or in Specifications, has been obtained with reasonable care, and has been recorded in good faith. However, District only warrants, and Bidder may only rely, on the accuracy of limited types of information.
 - (1) As to above-ground conditions or as-built conditions shown or indicated in the Contract Documents, there is no warranty, express or implied, or any representation express or implied, that such information is correctly shown or indicated. This information is verifiable by independent investigation and Bidder is required to make such verification as a condition to bidding. In submitting its Bid, Bidder shall rely on the results of its own independent investigation. In submitting its Bid, Bidder shall not rely on District-supplied information regarding above-ground conditions or as-built conditions.
 - (2) As to any subsurface condition shown or indicated in the Contract Documents, Bidder may rely only upon the general accuracy of actual reported depths, actual reported character of materials, actual

reported soil types, actual reported water conditions, or actual obstructions shown or indicated. District is not responsible for the completeness of such information for bidding or construction; nor is District responsible in any way for any conclusions or opinions that the Bidder has drawn from such information; nor is the District responsible for subsurface conditions that are not specifically shown (for example, District is not responsible for soil conditions in areas contiguous to areas where a subsurface condition is shown).

- h. Conditions Shown in Reports and Drawings Supplied for Informational Purposes: Reference is made to the document entitled Geotechnical Data, and the document entitled Existing Conditions, for identification of:
- (1) Subsurface Conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by Architect in preparing the Contract Documents; and
 - (2) Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that has been utilized by Architect in preparing the Contract Documents.
 - (3) These reports and drawings are **not** Contract Documents and, except for any "technical" data regarding subsurface conditions specifically identified in Geotechnical Data and Existing Conditions, and underground facilities data, Bidder may not in any manner rely on the information in these reports and drawings. Subject to the foregoing, Bidder must make its own independent investigation of all conditions affecting the Work and must not rely on information provided by District.
23. Bids shall be based on products and systems specified in Contract Documents or listed by name in Addenda. Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Bidder may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified. The District is not responsible and/or liable in any way for a Contractor's damages and/or claims related, in any way, to that Contractor's basing its bid on any requested substitution that the District has not approved in advance and in writing. Contractors and materials suppliers who submit requests for substitutions prior to the award of the Contract must do so in writing and in compliance with Public Contract Code section 3400. All requests must comply with the following:
- a. District must receive any notice of request for substitution of a specified item a minimum of **TEN (10)** calendar days prior to bid opening. The Successful Bidder will not be allowed to substitute specified items unless properly noticed.
 - b. Within 35 days after the date of the Notice of Award, the Successful Bidder shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system

and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the Specifications. Insufficient information shall be grounds for rejection of substitution.

- c. Approved substitutions, if any, shall be listed in Addenda. District reserves the right not to act upon submittals of substitutions until after bid opening.
 - d. Substitutions may be requested after Contract has been awarded only if indicated in and in accordance with requirements specified in the Special Conditions and the Specifications.
24. Bidders may examine any available "as-built" drawings of previous work by giving District reasonable advance notice. District will not be responsible for accuracy of "as-built" drawings. The document entitled Existing Conditions applies to all supplied "as-built" drawings.
 25. All questions about the meaning or intent of the Contract Documents are to be directed via email to the District to _____. Interpretations or clarifications considered necessary by the District in response to such questions will be issued in writing by Addenda and emailed, faxed, mailed, or delivered to all parties recorded by the District as having received the Contract Documents or posted on the District's website at _____. Questions received less than **SEVEN (7)** calendar days prior to the date for opening Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
 26. Addenda may also be issued to modify other parts of the Contract Documents as deemed advisable by the District.
 27. Each Bidder must acknowledge each Addendum in its Bid Form and Proposal by number or its Bid shall be considered non-responsive. Each Addendum shall be part of the Contract Documents. A complete listing of Addenda may be secured from the District.
 28. This Contract may include alternates. Alternates are defined as alternate products, materials, equipment, systems, methods, or major elements of the construction that may, at the District's option and under terms established in the Contract and pursuant to section 20103.8 of the Public Contract Code, be selected for the Work.
 29. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on the criteria as indicated in the Notice to Bidders. In the event two or more responsible bidders submit identical bids, the District shall select the Bidder to whom to award the Contract by lot.
 30. Discrepancies between written words and figures, or words and numeral, will be resolved in favor of figures or numerals.
 31. Bidders in contention for contract awards shall be required to attend a Post Bid interview, which will be set within three (3) calendar days following bid opening. A duly authorized representative of the apparent low bidder is required to attend the Post Bid Interview, in person. The apparent low bidder's authorized representative(s) must have (1) knowledge of how the bid submitted was prepared,

(2) the person responsible for supervising performance of the Work, and (3) the authority to bind the apparent low bidder. Failure to attend the Post Bid Interview as scheduled will be considered just cause for the District to reject the Bid as nonresponsive. .

32. Any bid protest by any Bidder regarding any other bid must be submitted in writing to the District, before 5:00 p.m. of the **THIRD (3rd)** business day following bid opening.
- a. Only a Bidder who has actually submitted a bid, and who could be awarded the Contract if the bid protest is upheld, is eligible to submit a bid protest. Subcontractors are not eligible to submit bid protests. A Bidder may not rely on the bid protest submitted by another Bidder.
 - b. A bid protest must contain a complete statement of any and all bases for the protest and all supporting documentation. Materials submitted after the bid protest deadline will not be considered.
 - c. The protest must refer to the specific portions of all documents that form the basis for the protest.
 - (1) Without limitation to any other basis for protest, an inadvertent error in listing the California contractor's license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.
 - (2) Without limitation to any other basis for protest, an inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:
 - (i) The subcontractor is registered prior to the bid opening.
 - (ii) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.
 - (iii) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.
 - d. The protest must include the name, address and telephone number of the person representing the protesting party.
 - e. The party filing the protest must concurrently transmit a copy of the protest and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

- f. The procedure and time limits set forth in this paragraph are mandatory and are each bidder's sole and exclusive remedy in the event of bid protest. Failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.
33. The Bidder to whom Contract is awarded shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award. Failure to properly and timely submit these documents entitles District to reject the bid as nonresponsive.
- a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.
 - b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.
 - c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.
 - d. Payment Bond (Contractor's Labor and Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.
 - e. Insurance Certificates and Endorsements as required.
 - f. Workers' Compensation Certification.
 - g. Prevailing Wage and Related Labor Requirements Certification.
 - h. Disabled Veteran Business Enterprise Participation Certification.
 - i. Drug-Free Workplace Certification.
 - j. Tobacco-Free Environment Certification.
 - k. Hazardous Materials Certification.
 - l. Lead-Based Materials Certification.
 - m. Imported Materials Certification.
 - n. Sex Offender Registration Act_Certification.
 - o. Buy American Certification.
 - p. Roofing Project Certification: from Contractor, Material Manufacturer and/or Vendor.
 - q. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.

34. Time for Completion: District may issue a Notice to Proceed within **NINETY (90)** days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.
- a. In the event that the District desires to postpone issuing the Notice to Proceed beyond this 90-day period, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed.
 - b. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed beyond a 90-day period. If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to the Contractor, the Contractor may terminate the Contract. Contractor's termination due to a postponement beyond this 90-day period shall be by written notice to District within **TEN (10)** calendar days after receipt by Contractor of District's notice of postponement.
 - c. It is further understood by the Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement and which the District had in writing authorized Contractor to perform prior to issuing a Notice to Proceed.
 - d. Should the Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.
35. District reserves the right to reject any or all bids, including without limitation the right to reject any or all nonconforming, non-responsive, unbalanced, or conditional bids, to re-bid, and to reject the bid of any bidder if District believes that it would not be in the best interest of the District to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by District. District also reserves the right to waive any inconsequential deviations or irregularities in any bid. For purposes of this paragraph, an "unbalanced bid" is one having nominal prices for some work items and/or enhanced prices for other work items.
36. It is the policy of the District that no qualified person shall be excluded from participating in, be denied the benefits of, or otherwise be subjected to discrimination in any consideration leading to the award of contract, based on race, color, gender, sexual orientation, political affiliation, age, ancestry, religion, marital status, national origin, medical condition or disability. The Successful Bidder and its subcontractors shall comply with applicable federal and state laws, including, but not limited to the California Fair Employment and Housing Act, beginning with Government Code section 12900, and Labor Code section 1735.

37. Prior to the award of Contract, District reserves the right to consider the responsibility of the Bidder. District may conduct investigations as District deems necessary to assist in the evaluation of any bid and to establish the responsibility, including, without limitation, qualifications and financial ability of Bidders, proposed subcontractors, suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to District's satisfaction within the prescribed time.

END OF DOCUMENT

DOCUMENT 00 21 13.1

BIDDER INFORMATION AND FORMS

**[INTENTIONALLY LEFT BLANK UNLESS PROVIDED IN SPECIAL CONDITIONS
– SEPARATE PREQUALIFICATION PROCESS RECOMMENDED]**

END OF DOCUMENT

DOCUMENT 00 31 19

EXISTING CONDITIONS

1. Summary

This document describes existing conditions at or near the Project, and use of information available regarding existing conditions. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. Reports and Information on Existing Conditions

- a. Documents providing a general description of the Site and conditions of the Work may have been collected by Peralta Community College District ("District"), its consultants, contractors, and tenants. These documents may, but are not required to, include previous contracts, contract specifications, tenant improvement contracts, as-built drawings, utility drawings, and information regarding underground facilities.
- b. Information regarding existing conditions may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports, documents, and other information are **not** part of the Contract Documents. These reports, documents, and other information do **not** excuse Contractor from fulfilling Contractor's obligation to independently investigate any or all existing conditions or from using reasonable prudent measures to avoid damaging existing improvements.
- c. Information regarding existing conditions may also be included in the Project Manual, but shall **not** be considered part of the Contract Documents.
- d. Prior to commencing this Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey.
- e. Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.
- f. The reports and other data or information regarding existing conditions and underground facilities at or contiguous to the Project are the following:
 - (1) Original Construction Drawings.
 - (2) Survey of Site.
 - (3) Geotechnical Report(s).
 - (4) Hazardous Material Report(s).
 - (5) Videotaped Survey(s).

3. Use of Information

- a. Information regarding existing conditions was obtained only for use of District and its consultants, contractors, and tenants for planning and design and is **not** part of the Contract Documents.
- b. District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any information regarding existing conditions. Bidder represents and agrees that in submitting a bid it is not relying on any information regarding existing conditions supplied by District.
- c. Under no circumstances shall District be deemed to warrant or represent existing above-ground conditions, as-built conditions, or other actual conditions, verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder must perform as a condition to bidding and Bidder should not and shall not rely on this information or any other information supplied by District regarding existing conditions.
- d. Any information shown or indicated in the reports and other data supplied herein with respect to existing underground facilities at or contiguous to the Project may be based upon information and data furnished to District by the District's employees and/or consultants or builders of such underground facilities or others. District does not assume responsibility for the completeness of this information, and Bidder is solely responsible for any interpretation or conclusion drawn from this information.
- e. District shall be responsible only for the general accuracy of information regarding underground facilities, and only for those underground facilities that are owned by District, and only where Bidder has conducted the independent investigation required of it pursuant to the Instructions to Bidders, and discrepancies are not apparent.

4. Investigations/Site Examinations

- a. Before submitting a Bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.
- b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a Bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in

the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

DOCUMENT 00 31 32

GEOTECHNICAL DATA

1. Summary

This document describes geotechnical data at or near the Project that is in the District's possession available for Contractor's review, and use of data resulting from various investigations. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. Geotechnical Reports

- a. Geotechnical reports may have been prepared for and around the Site and/or in connection with the Work by soil investigation engineers hired by Peralta Community College District ("District"), and its consultants, contractors, and tenants.
- b. Geotechnical reports may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports are **not** part of the Contract Documents.
- c. The reports and drawings of physical conditions that may relate to the Project are the following:

_____CGS APPLICATION NO. 01-CGS4714_____

3. Use of Data

- a. Geotechnical data were obtained only for use of District and its consultants, contractors, and tenants for planning and design and are **not** a part of Contract Documents.
- b. Except as expressly set forth below, District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any geotechnical data. Bidder represents and agrees that in submitting a Bid it is not relying on any geotechnical data supplied by District, except as specifically allowed below.
- c. Under no circumstances shall District be deemed to make a warranty or representation of existing above ground conditions, as-built conditions, geotechnical conditions, or other actual conditions verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder should perform as a condition to bidding and Bidder must not and shall not rely on information supplied by District.

4. Limited Reliance Permitted on Certain Information

- a. Reference is made herein for identification of:

Reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by District in preparation of the Contract Documents.

Drawings of physical conditions in or relating to existing subsurface structures (except underground facilities) that are at or contiguous to the Site and have been utilized by District in preparation of the Contract Documents.

- b. Bidder may rely upon the general accuracy of the "technical data" contained in the reports and drawings identified above, but only insofar as it relates to subsurface conditions, provided Bidder has conducted the independent investigation required pursuant to Instructions to Bidders, and discrepancies are not apparent. The term "technical data" in the referenced reports and drawings shall be limited as follows:
- (1) The term "technical data" shall include actual reported depths, reported quantities, reported soil types, reported soil conditions, and reported material, equipment or structures that were encountered during subsurface exploration. The term "technical data" does not include, and Bidder may not rely upon, any other data, interpretations, opinions or information shown or indicated in such drawings or reports that otherwise relate to subsurface conditions or described structures.
 - (2) The term "technical data" shall not include the location of underground facilities.
 - (3) Bidder may not rely on the completeness of reports and drawings for the purposes of bidding or construction. Bidder may rely upon the general accuracy of the "technical data" contained in such reports or drawings.
 - (4) Bidder is solely responsible for any interpretation or conclusion drawn from any "technical data" or any other data, interpretations, opinions, or information provided in the identified reports and drawings.

5. Investigations/Site Examinations

- a. Before submitting a Bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.

- b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a Bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

DOCUMENT 00 41 13
BID FORM AND PROPOSAL

To: Peralta Community College District ("District" or "Owner")

From: _____
(Proper Name of Bidder)

The undersigned declares that Bidder has read and understands the Contract Documents, including, without limitation, the Notice to Bidders and the Instructions to Bidders, and agrees and proposes to furnish all necessary labor, materials, and equipment to perform and furnish all work in accordance with the terms and conditions of the Contract Documents, including, without limitation, the Drawings and Specifications of Bid No. _ _____, for the following project known as:

("Project" or "Contract") and will accept in full payment for that Work the following total lump sum amount, all taxes included:

_____ dollars \$ _____

BASE BID

Bidder acknowledges and agrees that the Base Bid accounts for any and all Allowance(s), Total Cost for Unit Prices, and OCIP excluded costs.

Additive/Deductive Alternates:

Alternate #1

_____ dollars \$ _____

Additive/Deductive

Descriptions of alternates are primarily scope definitions and do not necessarily detail the full range of materials and processes needed to complete the construction.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

Additional Detail Regarding Calculation of Base Bid

1. **Unit Prices.** The Bidder’s Base Bid includes the following unit prices, which the Bidder must provide and the District may, at its discretion, utilize in valuing additive and/or deductive change orders (Unit Prices shall include all labor, materials, services, profit, overhead, insurance, bonds, taxes, and all other incidental costs of Contractor, subcontractors, and suppliers):

SCHEDULE OF UNIT PRICES

<u>Item No.</u>	<u>Description</u>	<u>Unit of Measure</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Total Cost = Unit Price x Estimated Quantity (Included in Base Bid)</u>
				\$ _____	\$ _____
				\$ _____	\$ _____

Where scope of Work is decreased, all Work pertaining to the item, whether specifically stated or not, shall be omitted, and where scope of Work is increased, all work pertaining to that item required to render same ready for use on the Project in accordance with intentions of the Drawings and Specifications shall be included in the above agreed-upon price amount.

2. **Allowance.** The Bidder’s Base Bid and each alternate shall include a ten percent (10%) allowance for Unforeseen Conditions.

The above allowance shall only be allocated for unforeseen items relating to the Work. Contractor shall not bill for or be due any portion of this allowance unless the District has identified specific work, Contractor has submitted a price for that work or the District has proposed a price for that work, the District has accepted the cost for that work, and the District has prepared an Allowance Expenditure Directive incorporating that work. Contractor hereby authorizes the District to execute a unilateral deductive change order at or near the end of the Project for all or any portion of the allowance not allocated.

- 3. **Purchase Price of Old Material.** Bidder specifically acknowledges and understands that if it is awarded the Contract, that pursuant to Education Code section 81454, that it will purchase and remove from the school grounds all old materials required by the specifications to be removed from any existing school building on the same school grounds and not required for school purposes and to state in his or her bid the amount which he or she will deduct from the price bid for the work as the purchase price of the old materials. The deducted amount must be shown separately below:

Deducted Purchase Price of Old Material

_____ dollars \$ _____
Deductive

- 4. **OCIP.** Bidder specifically acknowledges and understands that if it is awarded the Contract, that it and its subcontractors shall participate in and comply with the owner-controlled or wrap-up insurance program (OCIP). Bidder and all of its subcontractors are required to exclude the cost of insurance provided by the OCIP from its bid price for the proposed scope of work, including subcontracted work whether or not the subcontractor is identified at the time of the bid. The excluded amount must be shown separately below:

Excluded Cost of Insurance

_____ dollars \$ _____
Deductive

- 5. The undersigned has reviewed the Work outlined in the Contract Documents and fully understands the scope of Work required in this Proposal, understands the construction and project management function(s) is described in the Contract Documents, and that each Bidder who is awarded a contract shall be in fact a prime contractor, not a subcontractor, to the District, and agrees that its Proposal, if accepted by the District, will be the basis for the Bidder to enter into a contract with the District in accordance with the intent of the Contract Documents.
- 6. The undersigned has notified the District in writing of any discrepancies or omissions or of any doubt, questions, or ambiguities about the meaning of any of the Contract Documents, and has contacted the Construction Manager before bid date to verify the issuance of any clarifying Addenda.
- 7. The undersigned agrees to commence work under this Contract on the date established in the Contract Documents and to complete all work within the time specified in the Contract Documents.
- 8. The liquidated damages clause of the General Conditions and Agreement is hereby acknowledged.

- 9. It is understood that the District reserves the right to reject this bid and that the bid shall remain open to acceptance and is irrevocable for a period of ninety (90) days.
- 10. The following documents are attached hereto:
 - Bid Bond on the District's form or other security
 - Designated Subcontractors List
 - Site Visit Certification
 - Non-Collusion Declaration
 - Iran Contracting Act Certification
 - OCIP Insurance forms

11. Receipt and acceptance of the following Addenda is hereby acknowledged:

No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____

- 12. Bidder acknowledges that the license required for performance of the Work is a _____ license.
- 13. Bidder hereby certifies that Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work.
- 14. Bidder specifically acknowledges and understands that if it is awarded the Contract, that it shall perform the Work of the Project while complying with all requirements of the Department of Industrial Relations.
- 15. Bidder hereby certifies that its bid includes sufficient funds to permit Bidder to comply with all local, state or federal labor laws or regulations during the Project, including payment of prevailing wage, and that Bidder will comply with the provisions of Labor Code section 2810(d) if awarded the Contract.
- 16. Bidder agrees to comply with all requirements of the Project Labor Agreement.
- 17. Bidder specifically acknowledges and understands that if it is awarded the Contract, that it shall perform the Work of the Project while complying with the Davis Bacon Act, applicable reporting requirements, and any and all other applicable requirements for federal funding. If a conflict exists, the more stringent requirement shall control.
- 18. The Bidder represents that it is competent, knowledgeable, and has special skills with respect to the nature, extent, and inherent conditions of the Work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the Work that may create, during the Work, unusual or peculiar unsafe conditions hazardous to persons and property.

- 19. Bidder expressly acknowledges that it is aware of such peculiar risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the Work with respect to such hazards.
- 20. Bidder expressly acknowledges that it is aware that if a false claim is knowingly submitted (as the terms "claim" and "knowingly" are defined in the California False Claims Act, Gov. Code, § 12650 et seq.), the District will be entitled to civil remedies set forth in the California False Claim Act. It may also be considered fraud and the Contractor may be subject to criminal prosecution.
- 21. The undersigned Bidder certifies that it is, at the time of bidding, and shall be throughout the period of the Contract, licensed by the State of California to do the type of work required under the terms of the Contract Documents and registered as a public works contractor with the Department of Industrial Relations. Bidder further certifies that it is regularly engaged in the general class and type of work called for in the Contract Documents.

Furthermore, Bidder hereby certifies to the District that all representations, certifications, and statements made by Bidder, as set forth in this bid form, are true and correct and are made under penalty of perjury.

Dated this _____ day of _____ 20 ____

Name of Bidder: _____

Type of Organization: _____

Signed by: _____

Title of Signer: _____

Address of Bidder: _____

Taxpayer Identification No. of Bidder: _____

Telephone Number: _____

Fax Number: _____

E-mail: _____ Web Page: _____

Contractor's License No(s): No.: _____ Class: _____ Expiration Date: _____

No.: _____ Class: _____ Expiration Date: _____

No.: _____ Class: _____ Expiration Date: _____

Public Works Contractor Registration No.: _____

END OF DOCUMENT

DOCUMENT 00 43 13

BID BOND

(Note: If Bidder is providing a bid bond as its bid security, Bidder must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

That the undersigned, _____, as Principal ("Principal"),
and, _____, as Surety ("Surety"), a
corporation organized and existing under and by virtue of the laws of the State of ____ and
authorized to do business as a surety in the State of California, are held and firmly bound
unto the Peralta Community College District ("District") of Alameda County, State of
California, as Obligee, in an amount equal to ten percent (10%) of the Base Bid plus
alternates, in the sum of

_____ Dollars (\$ _____)

lawful money of the United States of America, for the payment of which sum well and truly
to be made, we, and each of us, bind ourselves, our heirs, executors, administrators,
successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted a
bid to the District for all Work specifically described in the accompanying bid for the
following project: _____ ("Project" or "Contract").

NOW, THEREFORE, if the Principal is awarded the Contract and, within the time and manner
required under the Contract Documents, after the prescribed forms are presented to
Principal for signature, enters into a written contract, in the prescribed form in accordance
with the bid, and files two bonds, one guaranteeing faithful performance and the other
guaranteeing payment for labor and materials as required by law, and meets all other
conditions to the Contract between the Principal and the District becoming effective, or if
the Principal shall fully reimburse and save harmless the District from any damage
sustained by the District through failure of the Principal to enter into the written contract
and to file the required performance and labor and material bonds, and to meet all other
conditions to the Contract between the Principal and the District becoming effective, then
this obligation shall be null and void; otherwise, it shall be and remain in full force and
effect. The full payment of the sum stated above shall be due immediately if Principal fails
to execute the Contract within seven (7) days of the date of the District's Notice of Award to
Principal.

Surety, for value received, hereby stipulates and agrees that no change, extension of time,
alteration or addition to the terms of the Contract or the call for bids, or to the work to be
performed thereunder, or the specifications accompanying the same, shall in any way affect
its obligation under this bond, and it does hereby waive notice of any such change,
extension of time, alteration or addition to the terms of the Contract or the call for bids, or
to the work, or to the specifications.

In the event suit is brought upon this bond by the District and judgment is recovered, the Surety shall pay all costs incurred by the District in such suit, including a reasonable attorneys' fee to be fixed by the Court.

If the District awards the bid, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal and Surety above named, on the _____ day of _____, 20__.

Principal

By

Surety

By

Name of California Agent of Surety

Address of California Agent of Surety

Telephone Number of California Agent of Surety

Bidder must attach Power of Attorney and Certificate of Authority for Surety and a Notarial Acknowledgment for all Surety's signatures. The California Department of Insurance must authorize the Surety to be an admitted Surety Insurer.

END OF DOCUMENT

DOCUMENT 00 43 36

DESIGNATED SUBCONTRACTORS LIST
(Public Contract Code Sections 4100-4114)

PROJECT: College of Alameda Transportation Technology _____

Bidder acknowledges and agrees that it must clearly set forth below the name, location and California contractor license number of each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the Work or who will specially fabricate and install a portion of the Work according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of one percent (0.5%) of Bidder's total Base Bid and the kind of Work that each will perform. Vendors or suppliers of materials only do not need to be listed.

Bidder acknowledges and agrees that, if Bidder fails to list as to any portion of Work, or if Bidder lists more than one subcontractor to perform the same portion of Work, Bidder must perform that portion itself or be subjected to penalty under applicable law. In case more than one subcontractor is named for the same kind of Work, state the portion of the kind of Work that each subcontractor will perform.

If alternate bid(s) is/are called for and Bidder intends to use subcontractors different from or in addition to those subcontractors listed for work under the Base Bid, Bidder must list subcontractors that will perform Work in an amount in excess of one half of one percent (0.5%) of Bidder's total Base Bid, plus alternate(s).

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

SITE VISIT CERTIFICATION

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID
IF SITE VISIT WAS MANDATORY

PROJECT: College of Alameda Transportation Technology

Check option that applies:

_____ I certify that I visited the Site of the proposed Work, received the attached pages of information, and became fully acquainted with the conditions relating to construction and labor. I fully understand the facilities, difficulties, and restrictions attending the execution of the Work under contract.

_____ I certify that _____ (Bidder's representative) visited the Site of the proposed Work, received the attached ___ pages of information, and became fully acquainted with the conditions relating to construction and labor. The Bidder's representative fully understood the facilities, difficulties, and restrictions attending the execution of the Work under contract.

Bidder fully indemnifies the Peralta Community College District, its Architect, its Engineers, its Construction Manager, and all of their respective officers, agents, employees, and consultants from any damage, or omissions, related to conditions that could have been identified during my visit and/or the Bidder's representative's visit to the Site.

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

ATTACHMENTS:

- 1.**
- 2.**
- 3.**

END OF DOCUMENT

DOCUMENT 00 45 19

NON-COLLUSION DECLARATION
(Public Contract Code Section 7106)

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.
[Title] [Name of Firm]

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____,
[Date]

at _____, _____.
[City] [State]

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 19.01

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Sections 2202-2208)

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Prior to bidding on or submitting a proposal for a contract for goods or services of \$1,000,000 or more, the bidder/proposer must submit this certification pursuant to Public Contract Code section 2204.

The bidder/proposer must complete **ONLY ONE** of the following two options. To complete OPTION 1, check the corresponding box **and** complete the certification below. To complete OPTION 2, check the corresponding box, complete the certification below, and attach documentation demonstrating the exemption approval.

- OPTION 1.** Bidder/Proposer is not on the current list of persons engaged in investment activities in Iran created by the California Department of General Services ("DGS") pursuant to Public Contract Code section 2203(b), and we are not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.
- OPTION 2.** Bidder/Proposer has received a written exemption from the certification requirement pursuant to Public Contract Code sections 2203(c) and (d). *A copy of the written documentation demonstrating the exemption approval is included with our bid/proposal.*

CERTIFICATION:

I, the official named below, CERTIFY UNDER PENALTY OF PERJURY, that I am duly authorized to legally bind the bidder/proposer to the OPTION selected above. This certification is made under the laws of the State of California.

<i>Vendor Name/Financial Institution (Printed)</i>	<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>	
<i>Printed Name and Title of Person Signing</i>	<i>Date Executed</i>

END OF DOCUMENT

DOCUMENT 00 45 26

WORKERS' COMPENSATION CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Labor Code section 3700, in relevant part, provides:

Every employer except the State shall secure the payment of compensation in one or more of the following ways:

- a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this state; and/or
- b. By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.

I am aware of the provisions of section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the Work of this Contract.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

(In accordance with Labor Code sections 1860 and 1861, the above certificate must be signed and filed with the awarding body prior to performing any Work under this Contract.)

END OF DOCUMENT

DOCUMENT 00 45 46. 01

**PREVAILING WAGE AND
RELATED LABOR REQUIREMENTS CERTIFICATION**

PROJECT/CONTRACT NO.: _____ between the Peralta Community
College District ("District") and _____
("Contractor" or "Bidder") ("Contract" or "Project").

I hereby certify that I will conform to the State of California Public Works Contract requirements regarding prevailing wages, benefits, on-site audits with 48-hours' notice, payroll records, and apprentice and trainee employment requirements, for all Work on the above Project including, without limitation, labor compliance monitoring and enforcement by the Department of Industrial Relations.

I hereby certify that I will also conform to the Federal Labor Standards Provisions regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon and Related Act requirements, Contract Work Hours and Safety Standards Act requirements, and any and all other applicable requirements for federal funding for all Work on the above Project.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.02

**DISABLED VETERAN BUSINESS
 ENTERPRISE PARTICIPATION CERTIFICATION**

PROJECT/CONTRACT NO.: _____ between the Peralta Community
 College District ("District") and _____
 ("Contractor" or "Bidder") ("Contract" or "Project").

GENERAL INSTRUCTIONS

Pursuant to Education Code section 71028 and Public Contract Code section 10115, the District has a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended each year on District projects. Therefore, the lowest responsive responsible bidder awarded the Contract must submit this document to the District with its executed Agreement, identifying the steps contractor took to solicit DVBE participation in conjunction with this Contract. **Do not submit this form with your bids.**

PART I – Method of Compliance with DVBE Participation Goals. Check the appropriate box to indicate your method of committing the contract dollar amount.

YOUR BUSINESS ENTERPRISE IS:	AND YOU WILL	AND YOU WILL
A. <input type="checkbox"/> Disabled veteran owned and your forces will perform at least 3% of this Contract	Include a copy of your DVBE letter from Office of Small Business and Disabled Veterans Business Enterprise Services ("OSDS")*	Complete Part 1 of this form and the Certification
B. <input type="checkbox"/> Disabled veteran owned but is unable to perform 3% of this Contract with your forces	Use DVBE subcontractors /suppliers to bring the Contract participation to at least 3%	Include a copy of each DVBE's letter from OSDS (including yours, if applicable), and complete Part 1 of this form and the Certification
C. <input type="checkbox"/> NOT disabled veteran owned	Use DVBE subcontractors /suppliers for at least 3% of this Contract	Complete all of this form and the Certification
D. <input type="checkbox"/> Unable to meet the required participation goals after good faith efforts	Make good faith efforts, including contacts, advertisement and DVBE solicitation	Complete all of this form and the Certification

* A DVBE letter from OSDS is obtained from the participating DVBE.

You must complete the following table to show the dollar amount of DVBE participation:

	TOTAL CONTRACT PRICE
A. Prime Bidder, if DVBE (own participation)	\$
B. DVBE Subcontractor or Supplier	
1.	
2.	
3.	
4.	
C. Subtotal (A & B)	
D. Non-DVBE	
E. Total Bid	

PART II – Contacts. To identify DVBE subcontractors/suppliers for participation in your contract, you must contact each of the following categories. You should contact several DVBE organizations.

CATEGORY	TELEPHONE NUMBER	DATE CONTACTED	PERSON CONTACTED
1. The District, if any			*
2. OSDS, provides assistance locating DVBEs at https://caleprocure.ca.gov/pages/PublicSearch/supplier-search.aspx	(916) 375-4940		*
3. DVBE Organization (List)			*

*Write "recorded message" in this column, if applicable.

PART III – Advertisement. You must advertise for DVBE participation in both a trade and focus paper. List the advertisement you place to solicit DVBE participation. Advertisements should be published at least fourteen (14) days prior to bid/proposal opening; if you cannot advertise fourteen (14) days prior, advertisements should be published as soon as possible. Advertisements must include that your firm is seeking DVBE participation, the project name and location, and you firm’s name, your contact person, and telephone number. Attach copies of advertisements to this form.

FOCUS/TRADE PAPER NAME	CHECK ONE		DATE OF ADVERTISEMENT
	TRADE	FOCUS	

PART IV – DVBE Solicitations. List DVBE subcontractors/suppliers that were invited to bid. Use the following instructions to complete the remainder of this section (read the three columns as a sentence from left to right). If you need additional space to list DVBE solicitations, please use a separate page and attach to this form.

IF THE DVBE.....	THEN.....	AND.....		
was selected to participate	Check "YES" in the "SELECTED" column	include a copy of their DVBE letter(s) from OSDS		
was NOT selected to participate	Check "NO" in the "SELECTED" column	state why in the "REASON NOT SELECTED" column		
did not respond to your solicitation	Check the "NO RESPONSE" column.			
DVBE CONTACTED	SELECTED		REASON NOT SELECTED	NO RESPONSE
	YES	NO		

A copy of this form must be retained by you and may be subject to a future audit.

CERTIFICATION

I, _____, certify that I am the bidder's _____
_____ and that I have made a diligent effort to ascertain the facts with regard to the
representations made herein. In making this certification, I am aware of section 12650 et
seq. of the Government Code providing for the imposition of treble damages for making
false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.03

DRUG-FREE WORKPLACE CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This Drug-Free Workplace Certification form is required from the successful Bidder pursuant to Government Code section 8350 et seq., the Drug-Free Workplace Act of 1990. The Drug-Free Workplace Act of 1990 requires that every person or organization awarded a contract or grant for the procurement of any property or service from any state agency must certify that it will provide a drug-free workplace by doing certain specified acts. In addition, the Act provides that each contract or grant awarded by a state agency may be subject to suspension of payments or termination of the contract or grant, and the contractor or grantee may be subject to debarment from future contracting, if the contracting agency determines that specified acts have occurred.

The District is not a "state agency" as defined in the applicable section(s) of the Government Code, but the District is a local agency and community college district under California law and requires all contractors on District projects to comply with the provisions and requirements of the Drug-Free Workplace Act of 1990.

Contractor must also comply with the provisions of Health & Safety Code section 11362.3 which prohibits the consumption or possession of cannabis or cannabis products in any public place, including on campus.

Contractor shall certify that it will provide a drug-free workplace by doing all of the following:

- a. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the person's or organization's workplace and specifying actions which will be taken against employees for violations of the prohibition.
- b. Establishing a drug-free awareness program to inform employees about all of the following:
 - (1) The dangers of drug abuse in the workplace.
 - (2) The person's or organization's policy of maintaining a drug-free workplace.
 - (3) The availability of drug counseling, rehabilitation, and employee-assistance programs.
 - (4) The penalties that may be imposed upon employees for drug abuse violations.
- c. Requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required above, and that, as a

condition of employment on the contract or grant, the employee agrees to abide by the terms of the statement.

I, the undersigned, agree to fulfill the terms and requirements of Government Code section 8355 listed above and will publish a statement notifying employees concerning (a) the prohibition of controlled substance at the workplace, (b) establishing a drug-free awareness program, and (c) requiring that each employee engaged in the performance of the Contract be given a copy of the statement required by section 8355(a), and requiring that the employee agree to abide by the terms of that statement.

I also understand that if the District determines that I have either (a) made a false certification herein, or (b) violated this certification by failing to carry out the requirements of section 8355, that the Contract awarded herein is subject to termination, suspension of payments, or both. I further understand that, should I violate the terms of the Drug-Free Workplace Act of 1990, I may be subject to debarment in accordance with the requirements of the aforementioned Act.

I acknowledge that I am aware of the provisions of and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990 and Health and Safety Code section 11362.3.

Date: _____
Proper Name of Contractor: _____
Signature: _____
Print Name: _____
Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.04

TOBACCO-FREE ENVIRONMENT CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This Tobacco-Free Environment Certification form is required from the successful Bidder.

Pursuant to, without limitation, 20 U.S.C. section 6083, Labor Code section 6400 et seq., Health & Safety Code section 104350 et seq., Business and Professions Code section 22950 et seq., and District Board policies, all District sites, including the Project site, are tobacco-free environments. Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. The prohibition on smoking includes the use of any electronic smoking device that creates an aerosol or vapor, in any manner or in any form, and the use of any oral smoking device for the purpose of circumventing the prohibition of tobacco smoking. Further, Health & Safety Code section 11362.3 prohibits the smoking or use of cannabis or cannabis products in any place where smoking tobacco is prohibited.

I acknowledge that I am aware of the District's policy regarding tobacco-free environments at District sites, including the Project site and hereby certify that I will adhere to the requirements of that policy and not permit any of my firm's employees, agents, subcontractors, or my firm's subcontractors' employees or agents, to use tobacco and/or smoke on the Project site.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.05

HAZARDOUS MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

1. Contractor hereby certifies that no asbestos, or asbestos-containing materials, polychlorinated biphenyl (PCB), or any material listed by the federal or state Environmental Protection Agency or federal or state health agencies as a hazardous material, or any other material defined as being hazardous under federal or state laws, rules, or regulations, ("New Hazardous Material"), shall be furnished, installed, or incorporated in any way into the Project or in any tools, devices, clothing, or equipment used to affect any portion of Contractor's work on the Project for District.
2. Contractor further certifies that it has instructed its employees with respect to the above-mentioned standards, hazards, risks, and liabilities.
3. Asbestos and/or asbestos-containing material shall be defined as all items containing but not limited to chrysotile, crocidolite, amosite, anthophyllite, tremolite, and actinolite. Any or all material containing greater than one-tenth of one percent (0.1%) asbestos shall be defined as asbestos-containing material.
4. Any disputes involving the question of whether or not material is New Hazardous Material shall be settled by electron microscopy or other appropriate and recognized testing procedure, at the District's determination. The costs of any such tests shall be paid by Contractor if the material is found to be New Hazardous Material.
5. All Work or materials found to be "New Hazardous Material" or Work or material installed with equipment containing "New Hazardous Material" will be immediately rejected and this Work will be removed at Contractor's expense at no additional cost to the District.
6. Contractor has read and understood the document titled Hazardous Materials Procedures & Requirements, and shall comply with all the provisions outlined therein. Contractor certifies that it is knowledgeable of, and shall comply with, all laws applicable to the Work, including, but not limited to, all federal, state, and local laws, statutes, standards, rules, regulations, and ordinances applicable to the Work.

Date: _____
Proper Name of Contractor: _____
Signature: _____
Print Name: _____
Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.06

LEAD-BASED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This certification provides notice to the Contractor that:

- (1) Contractor's work may disturb lead-containing building materials.
- (2) Contractor shall notify the District if any work may result in the disturbance of lead-containing building materials.
- (3) Contractor shall comply with the Renovation, Repair and Painting Rule, if lead-based paint is disturbed in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

1. Lead as a Health Hazard

Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure, much lower than previously believed, lead can impair the development of a child's central nervous system, causing learning disabilities, and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburse when paint chips, chalks, peels, wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child's hands and toys and then into a child's mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.

Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.

Because the Contractor and its employees will be providing services for the District, and because the Contractor's work may disturb lead-containing building materials, CONTRACTOR IS HEREBY NOTIFIED of the potential presence of lead-containing materials located within certain buildings utilized by the District. All school buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.

2. Overview of Law

Both the Federal Occupational Safety and Health Administration ("Fed/OSHA") and the California Division of Occupational Safety and Health ("Cal/OSHA") have implemented safety orders applicable to all construction work where a contractor's employee may be occupationally exposed to lead.

The OSHA Regulations apply to all construction work where a contractor's employee may be occupationally exposed to lead. The OSHA Regulations contain specific and detailed requirements imposed on contractors subject to those regulations. The OSHA Regulations define construction work as work for construction, alteration, and/or repair, including painting and decorating. Regulated construction work includes, but is not limited to, the following:

- a. Demolition or salvage of structures where lead or materials containing lead are present;
- b. Removal or encapsulation of materials containing lead;
- c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;
- d. Installation of products containing lead;
- e. Lead contamination/emergency cleanup;
- f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed; and
- g. Maintenance operations associated with the construction activities described in the subsection.

Because it is assumed by the District that all painted surfaces (interior as well as exterior) within the District contain some level of lead, it is imperative that the Contractor, its workers and subcontractors fully and adequately comply with all applicable laws, rules and regulations governing lead-based materials (including title 8, California Code of Regulations, section 1532.1).

Contractor shall notify the District if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated through the District. A signed copy of this Certification shall be on file prior to beginning Work on the Project, along with all current insurance certificates.

3. Renovation, Repair and Painting Rule, Section 402(c)(3) of the Toxic Substances Control Act

The EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).

The RRP requirements apply to all contractors who disturb lead-based paint in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors. If a DPH-certified inspector or risk assessor determines that a home constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

4. Contractor's Liability

If the Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, the Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold harmless the District, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom.

If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

It shall be the responsibility of the Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of the Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any school site within the District.

The Contractor shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District may request to examine, prior to the commencement of the Work, the lead training records of each employee of the Contractor.

THE CONTRACTOR HEREBY ACKNOWLEDGES, UNDER PENALTY OF PERJURY, THAT IT:

1. HAS RECEIVED NOTIFICATION OF POTENTIAL LEAD-BASED MATERIALS ON THE OWNER'S PROPERTY;
2. IS KNOWLEDGEABLE REGARDING AND WILL COMPLY WITH ALL APPLICABLE LAWS, RULES, AND REGULATIONS GOVERNING WORK WITH, AND DISPOSAL, OF LEAD.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.07

IMPORTED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This form shall be executed by all entities that, in any way, provide or deliver and/or supply any soils, aggregate, or related materials ("Fill") to the Project Site and shall be provided to the District at least ten (10) days before delivery. All Fill shall satisfy all requirements of any environmental review of the Project performed pursuant to the statutes and guidelines of the California Environmental Quality Act, section 21000 et seq. of the Public Resources Code ("CEQA"), and all requirements of section 17210 et seq. of the Education Code, including requirements for a Phase I environmental assessment acceptable to the State of California Community Colleges Chancellor's Office and Department of Toxic Substances Control.

Certification of: Delivery Firm/Transporter Supplier Manufacturer
 Wholesaler Broker Retailer
 Distributor Other _____

Type of Entity Corporation General Partnership
 Limited Partnership Limited Liability Company
 Sole Proprietorship Other _____

Name of firm ("Firm"): _____

Mailing address: _____

Addresses of branch office used for this Project: _____

If subsidiary, name and address of parent company: _____

By my signature below, I hereby certify that I am aware of section 25260 of the Health and Safety Code and the sections referenced therein regarding the definition of hazardous material. I further certify on behalf of the Firm that all soils, aggregates, or related materials provided, delivered, and/or supplied or that will be provided, delivered, and/or supplied by this Firm to the Project Site are free of any and all hazardous material as defined in section 25260 of the Health and Safety Code. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: _____

Proper Name of Firm: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.08

SEX OFFENDER REGISTRATION ACT CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This certification provides notice to the Contractor that:

- Penal Code section 290.001 requires every person required to register pursuant to sections 290 to 290.009, inclusive, of the Sex Offender Registration Act who is carrying on a vocation at the community college for more than fourteen (14) days, or for an aggregate period exceeding thirty (30) days in a calendar year, shall, in addition to the registration required by the Sex Offender Registration Act, register with the campus police department within five (5) working days of commencing employment at that community college on a form as may be required by the Department of Justice. The terms "employed or carries on a vocation" include employment whether or not financially compensated, volunteered, or performed for government or educational benefit.
- If the community college has no campus police department, the registrant shall instead register with the police of the city in which the campus is located or the sheriff of the county in which the campus is located if the campus is located in an unincorporated area or in a city that has no police department, on a form as may be required by the Department of Justice.
- The registrant shall also notify the campus police department within five (5) working days of ceasing to be employed, or ceasing to carry on a vocation, at the community college.

Contractor hereby acknowledges, under penalty of perjury, that it is aware of the provisions of section 290.001 of the Penal Code, and it will provide notice of the above provisions to all of its employees, subcontractors, and employees of subcontractors regardless of whether they are designated as employees or acting as independent contractors of the Contractor at least five (5) working days before commencing the performance of the Work of this Contract.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.09

BUY AMERICAN CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Federal regulations require that all of the iron, steel, and manufactured goods used in projects for the construction, installation, repairs, renovation, modernization, or maintenance of a public building or public work funded in part or in whole by federal stimulus funds, with the exception of projects funded by Qualified School Construction Bonds, be produced in the United States of America, unless a federal department waives this requirement because (1) it is inconsistent with the public interest, (2) the goods are not produced in sufficient quantities or of satisfactory quality in the United States, or (3) the requirement would increase the cost of the Project overall by more than twenty-five percent (25%) ("Buy American").

Contractor shall submit this Certification with its executed agreement, identifying the steps Contractor will take to use goods produced in the United States of America in carrying out this Contract. Bidder should not submit this form with its bid.

Contractor shall retain a copy of this form and may be subject to a future audit.

CERTIFICATION

On behalf of Contractor, I represent and covenant that Contractor will use on the Project only iron, steel and manufactured goods produced in the United States of America except goods for which a federal department has waived this requirement.

I, _____, certify that I am the Contractor's _____ and that the representations and covenants made herein are true and correct. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

By my signature below, I hereby certify that, to the best of my knowledge, the contents of this disclosure are true, or are believed to be true. I further certify on behalf of the Firm that I am aware of section 3000 et seq. of the California Public Contract Code, and the sections referenced therein regarding the penalties for providing false information or failing to disclose a financial relationship in this disclosure. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: _____

Proper Name of Firm: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 49

REGISTERED SUBCONTRACTORS LIST
(Labor Code Section 1771.1)

PROJECT: _____

Date Submitted (for Updates): _____

Contractor acknowledges and agrees that it must clearly set forth below the name and Department of Industrial Relations (DIR) registration number of each subcontractor **for all tiers** who will perform work or labor or render service to Contractor or its subcontractors in or about the construction of the Work **at least two (2) weeks before the subcontractor is scheduled to perform work**. This document is to be updated as all tiers of subcontractors are identified.

Contractor acknowledges and agrees that, if Contractor fails to list as to any subcontractor of any tier who performs any portion of Work, the Contract is subject to cancellation and the Contractor will be subjected to penalty under applicable law.

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Date: _____

Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 90

POST BID INTERVIEW

PART 1 – GENERAL

1.01 SUMMARY

If requested by the District, this Section requires the apparent low bidder to attend and participate in a Post Bid Interview with the Construction Manager, prior to award of any contract by the District. The Post Bid Interview will be scheduled by the Construction Manager within three (3) calendar days after the date of bid.

1.02 REQUIRED ATTENDANCE

- A. A duly authorized representative of the apparent low bidder is required to attend the Post Bid Interview, in person.
- B. The apparent low bidder's authorized representative(s) must have (1) knowledge of how the bid submitted was prepared, (2) the person responsible for supervising performance of the Work, and (3) the authority to bind the apparent low bidder.
- C. Failure to attend the Post Bid Interview as scheduled will be considered just cause for the District to reject the Bid as nonresponsive.

1.03 POST BID INTERVIEW PROCEDURE

- A. The Construction Manager will review the Bid with the attendees.
- B. The Construction Manager will review the Contract Documents with the attendees, including but not limited to:
 - (1) Insurance
 - (2) Bonding
 - (3) Addenda
 - (4) Pre-Bid Clarifications
 - (5) Scope of Work
 - (6) Bid Packages Descriptions
 - (7) Bid Alternates
 - (8) Contract Plans
 - (9) Contract Specifications
 - (10) Project Schedule and Schedule Requirements

- (11) Critical Dates Requirement for Other Bid Packages
- (12) Prevailing Wage Requirements
- (13) Liquidated Damages
- (14) Required Documentation for Contract Administration
- (15) Contract Coordination Requirements

1.04 POST BID INTERVIEW DOCUMENTATION

The Construction Manager will document the Post Bid Interview on the form attached to this Section. Both the apparent low bidder and the Construction Manager are required to sign the Post Bid Interview Documentation.

POST BID INTERVIEW

CONSTRUCTION MANAGER

[Name]
[Address 1]
[Address 2]
[Phone] [Fax]

BIDDER: _____

DATE: _____ TIME: _____ PHONE: _____

I. INTRODUCTIONS:

A. Present

_____	_____
CONTRACTOR	CONTRACTOR
_____	_____
_____	_____
[CM]	[CM]

II. PROPOSED CONTRACT:

III. PURPOSE OF INTERVIEW IS TO ASSURE A MUTUAL UNDERSTANDING OF THE FOLLOWING:

- A. Do you acknowledge submission of a complete and accurate bid? Yes No
- B. Do you acknowledge the Bid Document submittal timelines after NOA and NTP and can you meet those timelines? Yes No
- C. Do you acknowledge the requirements for the escrow of bid documents? Yes No
- D. Are you comfortable with your listed subcontractors? Yes No

IV. CONTRACTUAL REQUIREMENTS:

- A. Do you understand you are a prime contractor? Yes No
- B. Can you meet specified insurance requirements? Yes No
 - 1. Do any of your policies that require Additional Insured endorsements exceed the minimum coverage requirements? Yes No
 - 2. Are you requesting that the District accept an Umbrella or Excess Liability Insurance Policy to meet the policy limit? Yes No

3. Will there be a gap between the per occurrence amount of any underlying policy and the start of the coverage under the Umbrella or Excess Liability Insurance Policy? Yes No
- C. Will you provide the Performance Bond and Labor and Material Bond for 100% of the Contract Price as stipulated? Yes No
1. Cost for bond: _____% Yes No
2. Is the cost of your bond in your base bid? Yes No
3. Is your surety licensed to issue bonds in California? Yes No
- D. Do you understand the sex offender registration requirements? Yes No
- E. Is it understood that all workers must be paid prevailing wage? Yes No
- F. Is it understood that all subcontractors of every tier must be registered as a public works contractor with the Department of Industrial Relations Yes No
- V. SCOPE OF WORK:
- A. Acknowledged Receipt of Addenda #1-___ Yes No
- B. Are the costs for addenda items included in your bid? (if applicable) Yes No
- C. Do you have a complete understanding of your Scope of Work under the proposed Agreement? Yes No
- D. You have re-reviewed the documents and understand the Scope of the Work. Are there any items that require clarification? Yes No

If yes, please identify them.

1. _____

2. _____

3. _____

Is (are) there additional cost(s) for the above item(s)? Yes No

- | | | |
|---|-----|----|
| E. Have you reviewed bid alternative(s) #1-___? (If applicable) | Yes | No |
| F. Are the costs for bid alternatives included in your bid? | Yes | No |
| G. Are the plans and specifications clear and understandable to your satisfaction? | Yes | No |
| H. Do you acknowledge that the time to submit notice of requests for substitution of specified materials has expired? | Yes | No |

VI. SCHEDULE:

- | | | |
|---|-----|----|
| A. Do you acknowledge and agree to the stipulated completion dates and milestones in the contract? | Yes | No |
| 1. Will you provide a detailed construction schedule to _____ within the required ten (10) days of the Notice to Proceed, per the contract? | Yes | No |
| 2. Can you meet the submittal deadline? | Yes | No |
| 3. It is understood that the Project schedule is critical and that that weekend and overtime work may be required to meet the milestones. | Yes | No |
| 4. It is understood that if rain does occur, then all dewatering and protection of work is required, per the contract. If not, what do you believe must change and why? _____ | Yes | No |

- | | | |
|--|-----|----|
| B. Identify critical materials, deliveries, long lead items and other dependencies, including Owner Furnished items that could affect the completion of your work. | Yes | No |
| 1. _____ | | |
| 2. _____ | | |
| 3. _____ | | |
| 4. _____ | | |
| 5. _____ | | |

- C. Do you understand that there is going to be maintenance and other construction taking place on site during the course of the project? Yes No

VII. EXECUTION OF WORK

- A. Do you understand the access to the site? Yes No
- B. Do you understand the staging area restrictions? Yes No
- C. Have you included protection of [asphalt, floors, and roofs]? Yes No
- D. Do you understand that the site is occupied by students, teachers, administrators, parents, etc.? Yes No

VIII. CONTRACTOR COMMENTS/SUGGESTIONS:

1. _____
2. _____
3. _____
4. _____
5. _____

IX. CONTRACTOR

You agree the information contained herein is part of your contractual obligations. Your signature acknowledges your agreement to perform all Work in the Contract Documents, and that costs for all Work are included in your bid.

The foregoing information is true and accurate, and I am authorized to sign as an officer of the company I am representing.

[Company Name]

Signature _____ Title: _____

Date: _____

X. CONSTRUCTION MANAGER

Signature _____ Title: _____

Date: _____

Title of Document: POST BID INTERVIEW

Number of Pages: _____

Date of Document: _____

END OF DOCUMENT

DOCUMENT 00 51 00

NOTICE OF AWARD

Dated: _____ 20__

To: _____ (Contractor)

To: _____
(Address)

From: Governing Board ("Board") of the Peralta Community College District ("District")

RE: _____, Project No. _____ ("Project").

Contractor has been awarded the Contract for the above referenced Project on _____
_____, 20__, by action of the District's Board.

The Contract Price is _____ Dollars (\$ _____), and
includes alternates _____.

Three (3) copies of each of the Contract Documents (except Drawings) accompany this
Notice of Award. Three (3) sets of the Drawings will be delivered separately or otherwise
made available. Additional copies are available at cost of reproduction.

You must comply with the following conditions precedent within **SEVEN (7)** calendar days
of the date of this Notice of Award.

The Contractor shall execute and submit the following documents by 5:00 p.m. of the
SEVENTH (7th) calendar day following the date of the Notice of Award.

- a. Agreement: To be executed by successful Bidder. Submit three (3) copies,
each bearing an original signature.
- b. Escrow of Bid Documentation: This must include all required documentation.
See document titled Escrow Bid Documentation for more information.
- c. Performance Bond (100%): On the form provided in the Contract Documents
and fully executed as indicated on the form.
- d. Payment Bond (Contractor's Labor & Material Bond) (100%): On the form
provided in the Contract Documents and fully executed as indicated on the
form.
- e. Insurance Certificates and Endorsements as required.
- f. Workers' Compensation Certification.
- g. Prevailing Wage and Related Labor Requirements Certification.
- h. Disabled Veteran Business Enterprise Participation Certification.

- i. Drug-Free Workplace Certification.
- j. Tobacco-Free Environment Certification.
- k. Hazardous Materials Certification.
- l. Lead-Based Materials Certification.
- m. Imported Materials Certification.
- n. Sex Offender Registration Act Certification.
- o. Buy American Certification.
- p. Roof Project Certification: From Contractor, Material Manufacturer and/or Vendor.
- q. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.

Failure to comply with these conditions within the time specified will entitle District to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited, as well as any other rights the District may have against the Contractor.

After you comply with those conditions, District will return to you one fully signed counterpart of the Agreement.

PERALTA COMMUNITY COLLEGE DISTRICT

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

DOCUMENT 00 52 13

AGREEMENT

THIS AGREEMENT IS MADE AND ENTERED INTO THIS _____ DAY OF _____
_____, 20___, by and between the Peralta Community College District ("District") and _____
_____" ("Contractor")
("Agreement").

WITNESSETH: That the parties hereto have mutually covenanted and agreed, and by these presents do covenant and agree with each other, as follows:

- 1. The Work:** Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, and material necessary to perform and complete in a good and workmanlike manner, the work of the following project:

("Project" or "Contract" or "Work")

It is understood and agreed that the Work shall be performed and completed as required in the Contract Documents including, without limitation, the Drawings and Specifications and submission of all documents required to secure funding or by the Division of the State Architect for close-out of the Project, under the direction and supervision of, and subject to the approval of, the District or its authorized representative.

- 2. The Contract Documents:** The complete Contract consists of all Contract Documents as defined in the General Conditions and incorporated herein by this reference. Any and all obligations of the District and Contractor are fully set forth and described in the Contract Documents. All Contract Documents are intended to cooperate so that any Work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all Contract Documents.
- 3. Interpretation of Contract Documents:** Should any question arise concerning the intent or meaning of Contract Documents, including the Drawings or Specifications, the question shall be submitted to the District for interpretation. If a conflict exists in the Contract Documents, valid, written modifications, beginning with the most recent, shall control over this Agreement (if any), which shall control over the Special Conditions, which shall control over any Supplemental Conditions, which shall control over the General Conditions, which shall control over the remaining Division 0 documents, which shall control over Division 1 Documents which shall control over Division 2 through Division 49 documents, which shall control over figured dimensions, which shall control over large-scale drawings, which shall control over small-scale drawings. In the case of a discrepancy or ambiguity solely between and among the Drawings and Specifications, the discrepancy or ambiguity shall be resolved in favor of the interpretation that will provide District with the functionally complete and operable Project described in the Drawings and Specifications. In no case shall a document calling for lower quality and/or quantity material or workmanship control. The decision of the District in the matter shall be final.

- 4. Time for Completion:** It is hereby understood and agreed that the Work under this Contract shall be completed within _____ (_____) consecutive calendar days ("Contract Time") from the date specified in the District's Notice to Proceed.
- 5. Completion - Extension of Time:** Should the Contractor fail to complete this Contract, and the Work provided herein, within the time fixed for completion, due allowance being made for the contingencies provided for herein, the Contractor shall become liable to the District for all loss and damage that the District may suffer on account thereof. The Contractor shall coordinate its Work with the Work of all other contractors. The District shall not be liable for delays resulting from Contractor's failure to coordinate its Work with other contractors in a manner that will allow timely completion of Contractor's Work. Contractor shall be liable for delays to other contractors caused by Contractor's failure to coordinate its Work with the Work of other contractors.
- 6. Liquidated Damages:** Time is of the essence for all work under this Agreement. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage that the District will sustain in the event of and by reason of Contractor's delay; therefore, Contractor agrees that it shall pay to the District the sum of _____ dollars (\$_____) per day as liquidated damages for each and every day's delay beyond the time herein prescribed in finishing the Work.

It is hereby understood and agreed that this amount is not a penalty.

In the event that any portion of the liquidated damages is not paid to the District, the District may deduct that amount from any money due or that may become due the Contractor under this Agreement, and such deduction does not constitute a withholding or penalty. The District's right to assess liquidated damages is as indicated herein and in the General Conditions.

The time during which the Contract is delayed for cause, as hereinafter specified, may extend the time of completion for a reasonable time as the District may grant, provided that Contractor has complied with the claims procedure of the Contract Documents. This provision does not exclude the recovery of damages by either party under other provisions in the Contract Documents.

- 7. Loss Or Damage:** The District and its agents and authorized representatives shall not in any way or manner be answerable or suffer loss, damage, expense, or liability for any loss or damage that may happen to the Work, or any part thereof, or in or about the same during its construction and before acceptance, and the Contractor shall assume all liabilities of every kind or nature arising from the Work, either by accident, negligence, theft, vandalism, or any cause whatsoever; and shall hold the District and its agents and authorized representatives harmless from all liability of every kind and nature arising from accident, negligence, or any cause whatsoever.
- 8. Limitation Of District Liability:** District's financial obligations under this Contract shall be limited to the payment of the compensation provided in this Contract. Notwithstanding any other provision of this Contract, in no event shall District be liable, regardless of whether any claim is based on contract or tort, for any special, consequential, indirect or incidental damages, including, but not limited to, lost

profits or revenue, lost bonding capacity, arising out of or in connection with this Contract for the services performed in connection with this Contract.

- 9. Insurance and Bonds:** Prior to issuance of the Notice to Proceed by the District, Contractor shall provide all required certificates of insurance, insurance endorsements, and payment and performance bonds as evidence thereof.
- 10. Prosecution of Work:** If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this Contract, the District, may, pursuant to the General Conditions and without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.
- 11. Authority of Architect, Project Inspector, and DSA:** Contractor hereby acknowledges that the Architect(s), the Project Inspector(s), and the Division of the State Architect ("DSA") have authority to approve and/or suspend Work if the Contractor's Work does not comply with the requirements of the Contract Documents, Title 24 of the California Code of Regulations, and all applicable laws and regulations. The Contractor shall be liable for any delay caused by its non-compliant Work.
- 12. Assignment of Contract:** Neither the Contract, nor any part thereof, nor any moneys due or to become due thereunder, may be assigned by the Contractor without the prior written approval of the District, nor without the written consent of the Surety on the Contractor's Performance Bond (the "Surety"), unless the Surety has waived in writing its right to notice of assignment.
- 13. Classification of Contractor's License:** Contractor hereby acknowledges that it currently holds valid Type _____ Contractor's license(s) issued by the State of California, Contractors' State License Board, in accordance with division 3, chapter 9, of the Business and Professions Code and in the classification called for in the Contract Documents.
- 14. Registration as Public Works Contractor:** The Contractor and all Subcontractors currently are registered as public works contractors with the Department of Industrial Relations, State of California, in accordance with Labor Code section 1771.1.
- 15. Payment of Prevailing Wages:** The Contractor and all Subcontractors shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. The Contractor and all Subcontractors shall comply with the Davis Bacon Act, applicable reporting requirements, and any other applicable requirements for federal funding. If a conflict exists, the more stringent provision shall control over this Agreement.
- 16.** This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and Title 8 of the California Code of Regulations. Contractor specifically acknowledges and

understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code, including, without limitation, the requirement that the Contractor and all of its Subcontractors shall timely submit complete and accurate electronic certified payroll records as required by the Contract Documents, or the District may not issue payment.

- 17. **Contract Price:** In consideration of the foregoing covenants, promises, and agreements on the part of the Contractor, and the strict and literal fulfillment of each and every covenant, promise, and agreement, and as compensation agreed upon for the Work and construction, erection, and completion as aforesaid, the District covenants, promises, and agrees that it will well and truly pay and cause to be paid to the Contractor in full, and as the full Contract Price and compensation for construction, erection, and completion of the Work hereinabove agreed to be performed by the Contractor, the following price:

_____ Dollars
(\$ _____),

in lawful money of the United States, which sum is to be paid according to the schedule provided by the Contractor and accepted by the District and subject to additions and deductions as provided in the Contract. This amount supersedes any previously stated and/or agreed to amount(s).

- 18. **No Representations:** No representations have been made other than as set forth in writing in the Contract Documents, including this Agreement. Each of the Parties to this Agreement warrants that it has carefully read and understood the terms and conditions of this Agreement and all Contract Documents, and that it has not relied upon the representations or advice of any other Party or any attorney not its own.
- 19. **Entire Agreement:** The Contract Documents, including this Agreement, set forth the entire agreement between the parties hereto and fully supersede any and all prior agreements, understandings, written or oral, between the parties hereto pertaining to the subject matter thereof.
- 20. **Severability:** If any term, covenant, condition, or provision in any of the Contract Documents is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions in the Contract Documents shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby.

IN WITNESS WHEREOF, accepted and agreed on the date indicated above:

CONTRACTOR

**PERALTA COMMUNITY COLLEGE
DISTRICT**

By: _____

By: _____

Title: _____

Title: _____

NOTE: If the party executing this Contract is a corporation, a certified copy of the by-laws, or of the resolution of the Board of Directors, authorizing the officers of said corporation to execute the Contract and the bonds required thereby must be attached hereto.

DOCUMENT 00 55 00

NOTICE TO PROCEED

Dated: _____, 20__

TO: _____
("Contractor")

ADDRESS: _____

PROJECT: _____

PROJECT/CONTRACT NO.: _____ between the Peralta Community College District and Contractor ("Contract").

You are notified that the Contract Time under the above Contract will commence to run on _____, 20__. By that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement executed by Contractor, the date of completion is _____, 20__.

You must submit the following documents by 5:00 p.m. of the TENTH (10th) calendar day following the date of this Notice to Proceed:

- a. Contractor's preliminary schedule of construction.
- b. Contractor's preliminary schedule of values for all of the Work.
- c. Contractor's preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals
- d. Contractor's Safety Plan specifically adapted for the Project.
- e. Registered Subcontractors List: A complete subcontractors list for all tiers, including the name, address, telephone number, email address, facsimile number, California State Contractors License number, license classification, Department of Industrial Relations registration number, and monetary value of all Subcontracts.

Thank you. We look forward to a very successful Project.

PERALTA COMMUNITY COLLEGE DISTRICT

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

DOCUMENT 00 56 00

ESCROW BID DOCUMENTATION

1. Requirement to Escrow Bid Documentation

- a. Contractor shall submit, within **SEVEN (7)** calendar days after the date of the Notice of Award, one copy of all documentary information received or generated by Contractor in preparation of bid prices for this Contract, as specified herein. This material is referred to herein as "Escrow Bid Documentation." The Escrow Bid Documentation of the Contractor will be held in escrow for the duration of the Contract.
- b. Contractor agrees, as a condition of award of the Contract, that the Escrow Bid Documentation constitutes all written information used in the preparation of its bid, and that no other written bid preparation information shall be considered in resolving disputes or claims. Contractor also agrees that nothing in the Escrow Bid Documentation shall change or modify the terms or conditions of the Contract Documents.
- c. The Escrow Bid Documentation will not be opened by District except as indicated herein. The Escrow Bid Documentation will be used only for the resolution of change orders and claims disputes.
- d. Contractor's submission of the Escrow Bid Documentation, as with the bonds and insurance documents required, is considered an essential part of the Contract award. Should the Contractor fail to make the submission within the allowed time specified above, District may deem the Contractor to have failed to enter into the Contract, and the Contractor shall forfeit the amount of its bid security, accompanying the Contractor's bid, and District may award the Contract to the next lowest responsive responsible bidder.
- e. NO PAYMENTS WILL BE MADE, NOR WILL DISTRICT ACCEPT PROPOSED CHANGE ORDERS UNTIL THE ABOVE REQUIRED INFORMATION IS SUBMITTED AND APPROVED.
- f. The Escrow Bid Documentation shall be submitted in person by an authorized representative of the Contractor to the District.

2. Ownership of Escrow Bid Documentation

- a. The Escrow Bid Documentation is, and shall always remain, the property of Contractor, subject to review by District, as provided herein.
- b. Escrow Bid Documentation constitute trade secrets, not known outside Contractor's business, known only to a limited extent and only by a limited number of employees of Contractor, safeguarded while in Contractor's possession, extremely valuable to Contractor, and could be extremely valuable to Contractor's competitors by virtue of it reflecting Contractor's contemplated techniques of construction. Subject to the provisions herein, District agrees to safeguard the Escrow Bid Documentation, and all

information contained therein, against disclosure to the fullest extent permitted by law.

3. Format and Contents of Escrow Bid Documentation

- a. Contractor may submit Escrow Bid Documentation in its usual cost-estimating format; a standard format is not required. The Escrow Bid Documentation shall be submitted in the language (e.g., English) of the specification.
- b. Escrow Bid Documentation must clearly itemize the estimated costs of performing the work of each bid item contained in the bid schedule, separating bid items into sub-items as required to present a detailed cost estimate and allow a detailed cost review. The Escrow Bid Documentation shall include all subcontractor bids or quotes, supplier bids or quotes, quantity takeoffs, crews, equipment, calculations of rates of production and progress, copies of quotes from subcontractors and suppliers, and memoranda, narratives, add/deduct sheets, and all other information used by the Contractor to arrive at the prices contained in the bid proposal. Estimated costs should be broken down into Contractor's usual estimate categories such as direct labor, repair labor, equipment ownership and operation, expendable materials, permanent materials, and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Contractor's usual format. The Contractor's allocation of indirect costs, contingencies, markup, and other items to each bid item shall be identified.
- c. All costs shall be identified. For bid items amounting to less than \$10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials, and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and markup, as applicable, are allocated.
- d. Bid Documentation provided by District should not be included in the Escrow Bid Documentation unless needed to comply with the following requirements.

4. Submittal of Escrow Bid Documentation

- a. The Escrow Bid Documentation shall be submitted by the Contractor in a sealed container within **SEVEN (7)** calendar days after the date of the Notice of Award. The container shall be clearly marked on the outside with the Contractor's name, date of submittal, project name and the words "Escrow Bid Documentation – Intended to be opened in the presence of Authorized Representatives of Both District and Contractor".
- b. By submitting Escrow Bid Documentation, Contractor represents that the material in the Escrow Bid Documentation constitutes all the documentary information used in preparation of the bid and that the Contractor has personally examined the contents of the Escrow Bid Documentation container and has found that the documents in the container are complete.
- c. If Contractor's proposal is based upon subcontracting any part of the work, each subcontractor whose total subcontract price exceeds 5 percent of the total contract price proposed by Contractor, shall provide separate Escrow

Documents to be included with those of Contractor. Those documents shall be opened and examined in the same manner and at the same time as the examination described above for Contractor.

- d. If Contractor wishes to subcontract any portion of the Work after award, District retains the right to require Contractor to submit Escrow Documents for the Subcontractor before the subcontract is approved.

5. Storage, Examination and Final Disposition of Escrow Bid Documentation

- a. The Escrow Bid Documentation will be placed in escrow, for the life of the Contract, in a mutually agreeable institution. The cost of storage will be paid by Contractor for the duration of the project until final Contract payment. The storage facilities shall be the appropriate size for all the Escrow Bid Documentation and located conveniently to both District's and Contractor's offices.
- b. The Escrow Bid Documentation shall be examined by both District and Contractor, at any time deemed necessary by either District or Contractor, to assist in the negotiation of price adjustments and change orders or the settlement of disputes and claims. In the case of legal proceedings, Escrow Bid Documentation shall be used subject to the terms of an appropriate protective order if requested by Contractor and ordered by a court of competent jurisdiction. Examination of the Escrow Bid Documentation is subject to the following conditions:
 - (1) As trade secrets, the Escrow Bid Documentation is proprietary and confidential to the extent allowed by law.
 - (2) District and Contractor shall each designate, in writing to the other party **SEVEN (7)** calendar days prior to any examination, the names of representatives who are authorized to examine the Escrow Bid Documentation. No other person shall have access to the Escrow Bid Documentation.
 - (3) Access to the documents may take place only in the presence of duly designated representatives of the District and Contractor. If Contractor fails to designate a representative or appear for joint examination on **SEVEN (7)** calendar days' notice, then the District representative may examine the Escrow Bid Documents alone upon an additional **THREE (3)** calendar days' notice if a representative of the Contractor does not appear at the time set.
 - (4) If a subcontractor has submitted sealed information to be included in the Escrow Bid Documents, access to those documents may take place only in the presence of a duly designated representative of the District, Contractor and that subcontractor. If that subcontractor fails to designate a representative or appear for joint examination on **SEVEN (7)** calendar days' notice, then the District representative and/or the Contractor may examine the Escrow Bid Documentation without that subcontractor present upon an additional **THREE (3)** calendar days'

notice if a representative of that subcontractor does not appear at the time set.

- c. The Escrow Bid Documentation will be returned to Contractor at such time as the Contract has been completed and final settlement has been achieved.

END OF DOCUMENT

DOCUMENT 00 57 00

ESCROW AGREEMENT IN LIEU OF RETENTION
(Public Contract Code Section 22300)

(Note: Contractor must use this form.)

This Escrow Agreement in Lieu of Retention ("Escrow Agreement") is made and entered into this _____ day of _____, 20____, by and between the Peralta Community College District ("District"), whose address is 333 East 8th Street, Oakland, California 94606, and _____ ("Contractor"), whose address is _____, and _____ ("Escrow Agent"), a state or federally chartered bank in the state of California, whose address is _____.

For the consideration hereinafter set forth, District, Contractor, and Escrow Agent agree as follows:

- 1. Pursuant to section 22300 of Public Contract Code of the State of California, which is hereby incorporated by reference, Contractor has the following two (2) options:
 - Deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by District pursuant to the Construction Contract No. ____ entered into between District and Contractor for the _____ Project, in the amount of _____ Dollars (\$_____) dated, _____, 20____, (the "Contract"); **or**
 - On written request of Contractor, District shall make payments of the retention earnings for the above referenced Contract directly to Escrow Agent.

When Contractor deposits the securities as a substitute for Contract earnings (first option), Escrow Agent shall notify District within ten (10) calendar days of the deposit. The market value of the securities at the time of substitution and at all times from substitution until the termination of the Escrow Agreement shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between District and Contractor.

Securities shall be held in name of Peralta Community College School District, and shall designate Contractor as beneficial owner.

- 2. District shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to Contract provisions, provided that Escrow Agent holds securities in form and amount specified above.
- 3. When District makes payment of retention earned directly to Escrow Agent, Escrow Agent shall hold them for the benefit of Contractor until the time that the escrow created under this Escrow Agreement is terminated. Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow

Agreement and the rights and responsibilities of the Parties shall be equally applicable and binding when District pays Escrow Agent directly.

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of District. The District will charge Contractor \$_____ for each of District's deposits to the escrow account. These expenses and payment terms shall be determined by District, Contractor, and Escrow Agent.
5. Interest earned on securities or money market accounts held in escrow and all interest earned on that interest shall be for sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to District.
6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from District to Escrow Agent that District consents to withdrawal of amount sought to be withdrawn by Contractor.
7. District shall have the right to draw upon the securities and/or withdraw amounts from the Escrow Account in the event of default by Contractor. Upon seven (7) days' written notice to Escrow Agent from District of the default, if applicable, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by District. Escrow Agent shall not be authorized to determine the validity of any notice of default given by District pursuant to this paragraph, and shall promptly comply with District's instructions to pay over said escrowed assets. Escrow Agent further agrees to not interplead the escrowed assets in response to a conflicting demand.
8. Upon receipt of written notification from District certifying that the Contract is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payments of fees and charges.
9. Escrow Agent shall rely on written notifications from District and Contractor pursuant to Paragraphs 5 through 8, inclusive, of this Escrow Agreement and District and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of securities and interest as set forth above.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

10. Names of persons who are authorized to give written notice or to receive written notice on behalf of District and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of District:

On behalf of Contractor:

Title

Title

Name

Name

Signature

Signature

Address

Address

On behalf of Escrow Agent:

Title

Name

Signature

Address

At the time that the Escrow Account is opened, District and Contractor shall deliver to Escrow Agent a fully executed copy of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

On behalf of District:

On behalf of Contractor:

Title

Title

Name

Name

Signature

Signature

Address

Address

END OF DOCUMENT

DOCUMENT 00 61 13.13

PERFORMANCE BOND
(100% of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the Peralta Community College District ("District") and _____ ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project: _____ ("Project" or "Contract") which Contract dated _____, 20____, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, said Principal is required under the terms of the Contract to furnish a bond for the faithful performance of the Contract.

NOW, THEREFORE, the Principal and _____ ("Surety") are held and firmly bound unto the Board of the District in the penal sum of _____ Dollars (\$ _____), lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents, to:

- Promptly perform all the work required to complete the Project; and
- Pay to the District all damages the District incurs as a result of the Principal's failure to perform all the Work required to complete the Project.

Or, at the District's sole discretion and election, the Surety shall obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the District of the lowest responsible bidder, arrange for a contract between such bidder and the District and make available as Work progresses sufficient funds to pay the cost of completion less the "balance of the Contract Price," and to pay and perform all obligations of Principals under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of liquidated damages. The term "balance of the Contract Price," as used in this paragraph, shall mean the total amount payable to Principal by the District under the Contract and any modifications thereto, less the amount previously paid by the District to the Principal, less any withholdings by the District allowed under the Contract. District shall not be required or obligated to accept a tender of a completion contractor from the Surety for any or no reason.

The condition of the obligation is such that, if the above bound Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the Contract and any alteration thereof made as therein provided, on its part to be kept and performed at the time and in the intent and meaning, including all contractual guarantees and warranties of materials and workmanship, and shall indemnify and save harmless the

District, its trustees, officers and agents, as therein stipulated, then this obligation shall become null and void, otherwise it shall be and remain in full force and virtue.

Surety expressly agrees that the District may reject any contractor or subcontractor proposed by Surety to fulfill its obligations in the event of default by the Principal. Surety shall not utilize Principal in completing the Work nor shall Surety accept a Bid from Principal for completion of the Work if the District declares the Principal to be in default and notifies Surety of the District's objection to Principal's further participation in the completion of the Work.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period equal to the warranty and/or guarantee period of the Contract, during which time Surety's obligation shall continue if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the District from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the District's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure section 337.15.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond. The Surety also stipulates and agrees that it shall not be exonerated or released from the obligation of this bond by any overpayment or underpayment by the District that is based upon estimates approved by the Architect. The Surety does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the specifications.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20__.

Principal	Surety
By	By
	Name of California Agent of Surety
	Address of California Agent of Surety
	Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

DOCUMENT 00 61 13.16

PAYMENT BOND
Contractor's Labor & Material Bond
(100% Of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the Peralta Community College District, ("District") and _____, ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

_____ ("Project" or "Contract") which Contract dated _____, 20____, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, pursuant to law and the Contract, the Principal is required, before entering upon the performance of the work, to file a good and sufficient bond with the body by which the Contract is awarded in an amount equal to one hundred percent (100%) of the Contract price, to secure the claims to which reference is made in sections 9000 through 9510 and 9550 through 9566 of the Civil Code, and division 2, part 7, of the Labor Code.

NOW, THEREFORE, the Principal and _____ ("Surety") are held and firmly bound unto all laborers, material men, and other persons referred to in said statutes in the sum of _____ Dollars (\$_____), lawful money of the United States, being a sum not less than the total amount payable by the terms of Contract, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

The condition of this obligation is that if the Principal or any of its subcontractors, or the heirs, executors, administrators, successors, or assigns of any, all, or either of them shall fail to pay for any labor, materials, provisions, or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Principal or any of its subcontractors of any tier under Section 13020 of the Unemployment Insurance Code with respect to such work or labor, that the Surety will pay the same in an amount not exceeding the amount herein above set forth, and also in case suit is brought upon this bond, will pay a reasonable attorney's fee to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under section 9100 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void; otherwise it shall be and remain in full force and affect.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of Contract or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20__.

_____ Principal	_____ Surety
_____ By	_____ By
	_____ Name of California Agent of Surety
	_____ Address of California Agent of Surety
	_____ Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

DOCUMENT 00 63 40

ALLOWANCE EXPENDITURE DIRECTIVE FORM

Peralta Community College District
 333 East 8th Street
 Oakland, CA 94606

ALLOWANCE EXPENDITURE DIRECTIVE NO.:

ALLOWANCE EXPENDITURE DIRECTIVE

Project:
Bid No.:

Date:
DSA File No.:
DSA Appl. No.:

The following parties agree to the terms of this Allowance Expenditure Directive ("AED"):

Owner Name, Address, Telephone:

Contractor Name, Address, Telephone:

Reference	Description	Allowance Authorized for Expenditure
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	\$
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	\$
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	\$

Total Contract Allowance Amount:	\$
Amount of Previously Approved Allowance Expenditure Directive(s):	\$
Amount of this Allowance Expenditure Directive:	\$

The undersigned Contractor approves the foregoing release of allowance for completion of each specified item, and agrees to furnish all labor, materials and services and perform all work necessary to complete any additional work specified for the consideration stated therein ("Work"). Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650, et seq.

This Allowance Expenditure Directive must be signed by an authorized District representative.

It is expressly understood that the authorized allowance expenditure granted herein represent a full accord and satisfaction for any and all cost impacts of the items herein, and Contractor waives any and all further compensation based on the items herein. The value of the extra work or changes expressly includes any and all of the Contractor's costs and expenses, and its subcontractors, both direct and indirect. Any costs, expenses, or damages not included are deemed waived.

Signatures:

<p>DISTRICT:</p> <p>PERALTA _____ DISTRICT</p> <p>Date: _____</p> <p>By: _____ [Print Name and Title here]</p>	<p>CONTRACTOR:</p> <p>_____</p> <p>Date: _____</p> <p>By: _____ [Print Name and Title here]</p>
<p>ARCHITECT:</p> <p>_____</p> <p>Date: _____</p> <p>By: _____ [Print Name and Title here]</p>	<p>PROJECT INSPECTOR:</p> <p>_____</p> <p>Date: _____</p> <p>By: _____ [Print Name and Title here]</p>

END OF DOCUMENT

DOCUMENT 00 63 57

PROPOSED CHANGE ORDER FORM

Peralta Community College District
333 East 8th Street
Oakland, CA 94606

PCO NO.:

Project:
Bid No.:
RFI #:

Date:
DSA File No.:
DSA Appl. No.:

Contractor hereby submits for District’s review and evaluation this Proposed Change Order (“PCO”), submitted in accordance with and subject to the terms of the Contract Documents, including Sections 17.7 and 17.8 of the General Conditions. Any spaces left blank below are deemed no change to cost or time.

Contractor understands and acknowledges that documentation supporting Contractor’s PCO must be attached and included for District review and evaluation. Contractor further understands and acknowledges that failure to include documentation sufficient to, in District’s discretion, support some or all of the PCO, shall result in a rejected PCO.

	<u>WORK PERFORMED OTHER THAN BY CONTRACTOR</u>	<u>ADD</u>	<u>DEDUCT</u>
(a)	<u>Material</u> (attach suppliers’ invoice or itemized quantity and unit cost plus sales tax)		
(b)	<u>Add Labor</u> (attach itemized hours and rates, fully encumbered)		
(c)	<u>Add Equipment</u> (attach suppliers’ invoice)		
(d)	<u>Subtotal</u>		
(e)	<u>Add overhead and profit for any and all tiers of Subcontractor</u> , the total not to exceed ten percent (10%) of Item (d)		
(f)	<u>Subtotal</u>		
(g)	<u>Add Overhead and Profit for Contractor</u> , not to exceed five percent (5%) of Item (f)		
(h)	<u>Subtotal</u>		
(i)	<u>Add Bond and Insurance</u> , not to exceed one and a half percent (1.5%) of Item (h)		
(j)	<u>TOTAL</u>		
(k)	<u>Time</u> (zero unless indicated; “TBD” not permitted)	Calendar Days	

[REMAINDER OF PAGE LEFT BLANK INTENTIONALLY]

	WORK PERFORMED BY CONTRACTOR	ADD	DEDUCT
(a)	Material (attach itemized quantity and unit cost plus sales tax)		
(b)	Add Labor (attach itemized hours and rates, fully encumbered)		
(c)	Add Equipment (attach suppliers' invoice)		
(d)	Subtotal		
(e)	Add Overhead and Profit for Contractor , not to exceed fifteen percent (15%) of Item (d)		
(f)	Subtotal		
(g)	Add Bond and Insurance , not to exceed one and a half percent (1.5%) of Item (f)		
(h)	TOTAL		
(i)	Time (zero unless indicated; "TBD" not permitted)	_____	Calendar Days

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project including, without limitation, cumulative impacts. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

SUBMITTED BY:

Contractor:

[Name]

Date

END OF DOCUMENT

DOCUMENT 00 63 63

CHANGE ORDER FORM

Peralta Community College District
 333 East 8th Street
 Oakland, CA 94606

CHANGE ORDER NO.:

CHANGE ORDER

Project:
Bid No.:

Date:
DSA File No.:
DSA Appl. No.:

The following parties agree to the terms of this Change Order:

Owner:	[Name / Address]	Contractor:	[Name / Address]
Architect:	[Name / Address]	Project Inspector:	[Name / Address]

Reference	Description	Cost	Days Ext.
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	\$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	\$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	\$	
Contract time will be adjusted as follows:		Original Contract Amount:	\$
Previous Completion Date: __[Date]		Amount of Previously Approved Change Order(s):	\$
_____ [#] Calendar Days Extension (zero unless otherwise indicated)		Amount of this Change Order:	\$
Current Completion Date: __[Date]		Contract Amount:	\$

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire work as stated therein, and agrees to furnish all labor, materials and services and perform all work necessary to complete any additional work specified for the consideration stated therein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq.

This change order is subject to approval by the governing board of this District and must be signed by the District. Until such time as this change order is approved by the District's governing board and executed by a duly authorized District representative, this change order is not effective and not binding.

It is expressly understood that the compensation and time, if any, granted herein represent a full accord and satisfaction for any and all time and cost impacts of the items herein, and Contractor waives any and all further compensation or time extension based on the items herein. The value of the extra work or changes expressly includes any and all of the Contractor's costs and expenses, and its subcontractors, both direct and indirect, resulting from additional time required on the project or resulting from delay to the project including without limitation, cumulative impacts. Any costs, expenses, damages or time extensions not included are deemed waived.

Signatures:

District:

Contractor:

_____ [Name] _____ Date

_____ [Name] _____ Date

Architect:

Project Inspector:

_____ [Name] _____ Date

_____ [Name] _____ Date

END OF DOCUMENT

DOCUMENT 00 65 19.26

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS

THIS AGREEMENT AND RELEASE OF CLAIMS ("Agreement and Release") IS MADE AND ENTERED INTO THIS _____ DAY OF _____, 20__ by and between the PERALTA COMMUNITY COLLEGE DISTRICT ("District") and _____ ("Contractor"), whose place of business is _____.

RECITALS

WHEREAS, District and Contractor entered into PROJECT/CONTRACT NO.: _____ ("Contract" or "Project") in the County of Alameda, California; and

WHEREAS, the Work under the Contract was completed on _____, and a Notice of Completion was recorded with the County Recorder on _____.

NOW, THEREFORE, it is mutually agreed between District and Contractor as follows:

AGREEMENT AND RELEASE

1. Contractor will only be assessed liquidated damages as detailed below:

Original Contract Sum	\$_____
Modified Contract Sum	\$_____
Payment to Date	\$_____
Liquidated Damages	\$_____
Payment Due Contractor	\$_____

2. Subject to the provisions hereof, District shall forthwith pay to Contractor the undisputed sum of _____ Dollars (\$_____) under the Contract, less any amounts represented by any notice to withhold funds on file with District as of the date of such payment.

3. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against District arising from the performance of work under the Contract, except for the claims described in Paragraph 6 and continuing obligations described in Paragraph 8. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against District and all of its respective agents, employees, trustees, inspectors, assignees, consultants and transferees, except for any Disputed Claim that may be set forth in Paragraph 4 and the continuing obligations described in Paragraph 6 hereof.

4. The following claims are disputed (hereinafter, the "Disputed Claims") and are specifically excluded from the operation of this Agreement and Release:

<u>Claim No.</u>	<u>Description of Claim</u>	<u>Amount of Claim</u>	<u>Date Claim Submitted</u>
_____	_____	\$ _____	_____
_____	_____	\$ _____	_____
_____	_____	\$ _____	_____
_____	_____	\$ _____	_____

[If further space is required, attach additional sheets showing the required information.]

5. Consistent with California Public Contract Code section 7100, Contractor hereby agrees that, in consideration of the payment set forth in Paragraph 4 hereof, Contractor hereby releases and forever discharges District, all its agents, employees, inspectors, assignees, and transferees from any and all liability, claims, demands, actions, or causes of action of whatever kind or nature arising out of or in any way concerned with the Work under the Contract.
6. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, including without limitation the duty to defend, indemnify and hold harmless the District, shall remain in full force and effect as specified in the Contract Documents.
7. Contractor hereby waives the provisions of California Civil Code section 1542 which provides as follows:
- A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE, AND THAT, IF KNOWN BY HIM OR HER WOULD HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY.
8. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable. If any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, county, municipal, or other law, ruling, or regulations, then such provision, or part thereof, shall remain in force and effect to the extent permitted by law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.

9. All rights of District shall survive completion of the Work or termination of Contract, and execution of this Release.

* * * CAUTION: THIS IS A RELEASE - READ BEFORE EXECUTING * * *

PERALTA COMMUNITY COLLEGE DISTRICT

Signature: _____

Print Name: _____

Title: _____

CONTRACTOR: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 65 36

GUARANTEE FORM

_____ ("Contractor") hereby agrees that the _____
_____ ("Work" of Contractor) which Contractor has installed for the Peralta
Community College District ("District") for the following project:

PROJECT: _____

("Project" or "Contract") has been performed in accordance with the requirements of the
Contract Documents and that the Work as installed will fulfill the requirements of the
Contract Documents.

The undersigned agrees to repair or replace any or all of such Work that may prove to be
defective in workmanship or material together with any other adjacent Work that may be
displaced in connection with such replacement within a period of _____
year(s) from the date of completion as defined in Public Contract Code section 7107,
subdivision (c), ordinary wear and tear and unusual abuse or neglect excepted. The date of
completion is _____, 20____.

In the event of the undersigned's failure to comply with the above-mentioned conditions
within a reasonable period of time, as determined by the District, but not later than seven
(7) days after being notified in writing by the District, the undersigned authorizes the
District to proceed to have said defects repaired and made good at the expense of the
undersigned. The undersigned shall pay the costs and charges therefor upon demand.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

Representatives to be contacted for service subject to terms of Contract:

Name: _____

Address: _____

Phone No.: _____

Email: _____

END OF DOCUMENT

DOCUMENT 00 72 13

TABLE OF CONTENTS

	<u>Page</u>
1. CONTRACT TERMS AND DEFINITIONS	1
1.1 Definitions.....	1
1.2 Laws Concerning the Contract.....	6
1.3 No Oral Agreements	6
1.4 No Assignment.....	6
1.5 Notice and Service Thereof	7
1.6 No Waiver	7
1.7 Substitutions for Specified Items.....	7
1.8 Materials and Work.....	8
2. [RESERVED]	9
3. ARCHITECT	9
4. CONSTRUCTION MANAGER.....	10
5. INSPECTOR, INSPECTIONS, AND TESTS.....	10
5.1 Project Inspector.....	10
5.2 Tests and Inspections	11
5.3 Costs for After Hours and/or Off Site Inspections	11
6. CONTRACTOR	12
6.1 Status of Contractor	12
6.2 Project Inspection Card(s)	12
6.3 Contractor’s Supervision	12
6.4 Duty to Provide Fit Workers.....	13
6.5 Field Office	13
6.6 Purchase of Materials and Equipment.....	14

6.7	Documents on Work	14
6.8	Preservation of Records	14
6.9	Integration of Work	15
6.10	Notifications	16
6.11	Obtaining of Permits, Licenses and Registrations	16
6.12	Royalties and Patents	16
6.13	Work to Comply With Applicable Laws and Regulations	17
6.14	Safety/Protection of Persons and Property	18
6.15	Working Evenings and Weekends	20
6.16	Cleaning Up.....	20
7.	SUBCONTRACTORS	21
8.	OTHER CONTRACTS/CONTRACTORS	23
9.	DRAWINGS AND SPECIFICATIONS	24
10.	CONTRACTOR'S SUBMITTALS AND SCHEDULES	25
10.1	Schedule of Work, Schedule of Submittals, and Schedule of Values	25
10.2	Monthly Progress Schedule(s)	28
10.3	Material Safety Data Sheets (MSDS).....	28
11.	SITE ACCESS, CONDITIONS, AND REQUIREMENTS	29
11.1	Site Investigation	29
11.2	Soils Investigation Report.....	29
11.3	Access to Work	29
11.4	Layout and Field Engineering	30
11.5	Utilities	30
11.6	Sanitary Facilities	30
11.7	Surveys	30
11.8	Regional Notification Center.....	30

11.9 Existing Utility Lines 31

11.10 Notification 31

11.11 Hazardous Materials 31

11.12 No Signs 32

12. TRENCHES 32

12.1 Trenches Greater Than Five Feet 32

12.2 Excavation Safety 32

12.3 No Tort Liability of District 32

12.4 No Excavation without Permits 32

12.5 Discovery of Hazardous Waste and/or Unusual Conditions 32

13. INSURANCE AND BONDS 33

13.1 Insurance 33

13.2 Contract Security - Bonds 37

14. WARRANTY/GUARANTEE/INDEMNITY 38

14.1 Warranty/Guarantee 38

14.2 Indemnity and Defense 39

15. TIME 40

15.1 Notice to Proceed 40

15.2 Computation of Time / Adverse Weather 41

15.3 Hours of Work 41

15.4 Progress and Completion 42

15.5 Schedule 42

15.6 Expeditious Completion 42

16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES 42

16.1 Liquidated Damages 42

16.2 Excusable Delay 43

16.3 No Additional Compensation for Delays Within Contractor’s Control 44

16.4 Float or Slack in the Schedule 44

17. CHANGES IN THE WORK 44

17.1 No Changes Without Authorization 44

17.2 Architect Authority 45

17.3 Change Orders..... 45

17.4 Construction Change Directives..... 46

17.5 Force Account Directives 46

17.6 Price Request..... 47

17.7 Proposed Change Order 47

17.8 Format for Proposed Change Order..... 50

17.9 Change Order Certification 52

17.10 Determination of Change Order Cost 52

17.11 Deductive Change Orders 53

17.12 Addition or Deletion of Alternate Bid Item(s) 53

17.13 Discounts, Rebates, and Refunds 53

17.14 Accounting Records 53

17.15 Notice Required 54

17.16 Applicability to Subcontractors 54

17.17 Alteration to Change Order Language 54

17.18 Failure of Contractor to Execute Change Order..... 54

18. REQUEST FOR INFORMATION 55

19. PAYMENTS 55

19.1 Contract Price 55

19.2 Applications for Progress Payments 55

19.3 Progress Payments 58

19.4 Decisions to Withhold Payment 60

19.5 Subcontractor Payments 62

20. COMPLETION OF THE WORK 62

20.1 Completion 62

20.2 Close-Out/Certification Procedures 63

20.3 Final Inspection 64

20.4 Costs of Multiple Inspections..... 65

20.5 Partial Occupancy or Use Prior to Completion 65

21. FINAL PAYMENT AND RETENTION..... 66

21.1 Final Payment..... 66

21.2 Prerequisites for Final Payment 66

21.3 Retention 67

21.4 Substitution of Securities 67

22. UNCOVERING OF WORK..... 67

23. NONCONFORMING WORK AND CORRECTION OF WORK 67

23.1 Nonconforming Work 67

23.2 Correction of Work 68

23.3 District's Right to Perform Work 68

24. TERMINATION AND SUSPENSION 69

24.1 District’s Request for Assurances..... 69

If District at any time reasonably believes Contractor is or may be in default under this Contract, District may in its sole discretion notify Contractor of this fact and request written assurances from Contractor of performance of Work and a written plan from Contractor to remedy any potential default under the terms this Contract that the District may advise Contractor of in writing. Contractor shall, within ten (10) calendar days of District’s request, deliver a written cure plan that meets the District’s requirements in its request for assurances. Contractor’s failure to provide such written assurances of performance and the required written plan, within ten (10) calendar days of request, will constitute a material breach of this Contract sufficient to justify termination for cause. 69

- 24.2 District's Right to Terminate Contractor for Cause 69
- 24.3 Termination of Contractor for Convenience 70
- 24.4 Effect of Termination 71
- 24.5 Emergency Termination of Public Contracts Act of 1949 72
- 24.6 Suspension of Work 73
- 25. CLAIMS PROCESS 73
 - 25.1 Obligation to File Claims for Disputed Work 73
 - 25.2 Duty to Perform during during Claims Process..... 73
 - 25.3 Definition of a Claim 74
 - 25.4 Claims Presentation 74
 - 25.5 Claim Resolution pursuant to Public Contract Code section 9204 75
 - 25.6 Subcontractor Pass-Through Claims..... 77
 - 25.7 Government Code Claim Act Claim 77
 - 25.8 Claim Resolution pursuant to Public Contract Code section 20104 et seq..... 78
 - 25.9 Claim Procedure Compliance..... 79
 - 25.10 Claim Resolution Non-Applicability 80
- 26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS 80
 - 26.1 Labor Compliance and Enforcement 80
 - 26.2 Wage Rates, Travel, and Subsistence..... 80
 - 26.3 Hours of Work 81
 - 26.4 Payroll Records 82
 - 26.5 [RESERVED] 83
 - 26.6 Apprentices 83
 - 26.7 Non-Discrimination 85
 - 26.8 Labor First Aid 85
- 27. [RESERVED] 85

28. MISCELLANEOUS 85

28.1 Assignment of Antitrust Actions 85

28.2 Excise Taxes 86

28.3 Taxes 86

28.4 Shipments..... 86

28.5 Compliance with Government Reporting Requirements 86

GENERAL CONDITIONS

1. CONTRACT TERMS AND DEFINITIONS

1.1 Definitions

Wherever used in the Contract Documents, the following terms shall have the meanings indicated, which shall be applicable to both the singular and plural thereof:

1.1.1 Adverse Weather: Shall be only weather that satisfies all of the following conditions: (1) unusually severe precipitation, sleet, snow, hail, or extreme temperature conditions in excess of the norm for the location and time of year it occurred based on the closest weather station data averaged over the past five years, (2) that is unanticipated and would cause unsafe work conditions and/or is unsuitable for scheduled work that should not be performed during inclement weather (i.e., exterior finishes), and (3) at the Project.

1.1.2 Allowance Expenditure Directive: Written authorization for expenditure of allowance, if any.

1.1.3 Approval, Approved, and/or Accepted: Written authorization, unless stated otherwise.

1.1.4 Architect (or "Design Professional in General Responsible Charge"): The individual, partnership, corporation, joint venture, or any combination thereof, named as Architect, who will have the rights and authority assigned to the Architect in the Contract Documents. The term Architect means the Design Professional in General Responsible Charge as defined in DSA PR 13-02 on this Project or the Architect's authorized representative.

1.1.5 As-Builts: Reproducible blue line prints of drawings to be prepared on a monthly basis pursuant to the Contract Documents, that reflect changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed since the preceding monthly submittal. See **Record Drawings**.

1.1.6 Bidder: A contractor who intends to provide a proposal to the District to perform the Work of this Contract.

1.1.7 Change Order: A written order to the Contractor authorizing an addition to, deletion from, or revision in the Work, and/or authorizing an adjustment in the Contract Price or Contract Time.

1.1.8 Claim: A Dispute that remains unresolved at the conclusion of the all the applicable Dispute Resolution requirements provided herein.

1.1.9 Construction Change Directive: A written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work.

1.1.10 Construction Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Construction Manager is used on the Project that is the subject of this Contract, then all references to Construction Manager herein shall be read to refer to District.

1.1.11 Construction Schedule: The progress schedule of construction of the Project as provided by Contractor and approved by District.

1.1.12 Contract, Contract Documents: The Contract consists exclusively of the documents evidencing the agreement of the District and Contractor, identified as the Contract Documents. The Contract Documents consist of the following documents:

- 1.1.12.1** Notice to Bidders
- 1.1.12.2** Instructions to Bidders
- 1.1.12.3** Bid Form and Proposal
- 1.1.12.4** Bid Bond
- 1.1.12.5** Designated Subcontractors List
- 1.1.12.6** Site Visit Certification (if a site visit was required)
- 1.1.12.7** Non-Collusion Declaration
- 1.1.12.8** Notice of Award
- 1.1.12.9** Notice to Proceed
- 1.1.12.10** Agreement
- 1.1.12.11** Escrow of Bid Documentation
- 1.1.12.12** Escrow Agreement for Security Deposits in Lieu of Retention (if applicable)
- 1.1.12.13** Performance Bond
- 1.1.12.14** Payment Bond (Contractor's Labor & Material Bond)
- 1.1.12.15** General Conditions
- 1.1.12.16** Special Conditions (if applicable)
- 1.1.12.17** Project Labor Agreement (if applicable)
- 1.1.12.18** Hazardous Materials Procedures and Requirements
- 1.1.12.19** Workers' Compensation Certification
- 1.1.12.20** Prevailing Wage Certification
- 1.1.12.21** Disabled Veteran Business Enterprise Participation Certification (if applicable)
- 1.1.12.22** Drug-Free Workplace Certification (if applicable)
- 1.1.12.23** Tobacco-Free Environment Certification
- 1.1.12.24** Hazardous Materials Certification (if applicable)
- 1.1.12.25** Lead-Based Materials Certification (if applicable)
- 1.1.12.26** Imported Materials Certification (if applicable)
- 1.1.12.27** Sex Offender Registration Act Certification (if applicable)
- 1.1.12.28** Buy American Certification (if applicable)
- 1.1.12.29** Roofing Project Certification (if applicable)
- 1.1.12.30** Registered Subcontractors List
- 1.1.12.31** Iran Contracting Act Certification (if applicable)
- 1.1.12.32** Post Bid Interview
- 1.1.12.33** All Plans, Technical Specifications, and Drawings
- 1.1.12.34** Any and all addenda to any of the above documents
- 1.1.12.35** Any and all change orders or written modifications to the above documents if approved in writing by the District

1.1.13 Contract Price: The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.1.14 Contract Time: The time period stated in the Agreement for the completion of the Work.

1.1.15 Contractor: The person or persons identified in the Agreement as contracting to perform the Work to be done under this Contract, or the legal representative of such a person or persons.

1.1.16 Daily Job Report(s): Daily Project reports prepared by the Contractor's employee(s) who are present on Site, which shall include the information required herein.

1.1.17 Day(s): Unless otherwise designated, day(s) means calendar day(s).

1.1.18 Department of Industrial Relations (or "DIR"): is responsible, among other things, for labor compliance monitoring and enforcement of California prevailing wage laws and regulations for public works contracts.

1.1.19 Design Professional in General Responsible Charge: See definition of **Architect** above.

1.1.20 Dispute: A separate demand by Contractor for a time extension, or payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to; or an amount of payment disputed by the District.

1.1.21 District: The public agency or the district for which the Work is performed. The governing board of the District or its designees will act for the District in all matters pertaining to the Contract. The District may, at any time,

1.1.21.1 Direct the Contractor to communicate with or provide notice to the Construction Manager or the Architect on matters for which the Contract Documents indicate the Contractor will communicate with or provide notice to the District; and/or

1.1.21.2 Direct the Construction Manager or the Architect to communicate with or direct the Contractor on matters for which the Contract Documents indicate the District will communicate with or direct the Contractor.

1.1.22 Drawings (or "Plans"): The graphic and pictorial portions of the Contract Documents showing the design, location, scope and dimensions of the work, generally including plans, elevations, sections, details, schedules, sequence of operation, and diagrams.

1.1.23 DSA: Division of the State Architect.

1.1.24 Force Account Directive: A process that may be used when the District and the Contractor cannot agree on a price for a specific portion of work or before the Contractor prepares a price for a specific portion of work and whereby the Contractor performs the work as indicated herein on a time and materials basis.

1.1.25 Job Cost Reports: Any and all reports or records detailing the costs associated with work performed on or related to the Project that Contractor shall maintain for the Project. Specifically, Job Cost Reports shall contain, but are not limited by or to, the following information: a description of the work performed or to be performed on the Project; quantity, if applicable, of work performed (hours, square feet, cubic yards, pounds, etc.) for the Project; Project budget; costs for the Project to date; estimated costs to complete the Project; and expected costs at completion. The Job Cost Reports shall also reflect all Contract cost codes, change orders, elements of non-conforming work, back charges, and additional services.

1.1.26 Labor Commissioner's Office (or "Labor Commissioner", also known as the Division of Labor Standards Enforcement ("DLSE")): Division of the DIR responsible for adjudicating wage claims, investigating discrimination and public works complaints, and enforcing Labor Code statutes and Industrial Welfare Commission orders.

1.1.27 Municipal Separate Storm Sewer System (or "MS4"): A system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

1.1.28 Plans: See **Drawings**.

1.1.29 Premises: The real property owned by the District on which the Site is located.

1.1.30 Product(s): New material, machinery, components, equipment, fixtures and systems forming the Work, including existing materials or components required and approved by the District for reuse.

1.1.31 Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.

1.1.32 Program Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Program Manager is designated for Project that is the subject of this Contract, then all references to Project Manager herein shall be read to refer to District.

1.1.33 Project: The planned undertaking as provided for in the Contract Documents.

1.1.34 Project Inspector (or "Inspector"): The individual(s) retained by the District in accordance with title 24 of the California Code of Regulations to monitor and inspect the Project.

1.1.35 Project Labor Agreement (or "PLA"): a prehire collective bargaining agreement in accordance with Public Contract Code section 2500 *et seq.* that establishes terms and conditions of employment for a specific construction project or projects and/or is an agreement described in Section 158(f) of Title 29 of the United States Code.

1.1.36 Proposed Change Order (or "PCO"): a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

1.1.37 Provide: Shall include "provide complete in place," that is, "furnish and install," and "provide complete and functioning as intended in place" unless specifically stated otherwise.

1.1.38 Qualified SWPPP Practitioners (or "QSP"): certified personnel that attended a State Water Resources Control Board sponsored or approved training class and passed the qualifying exam.

1.1.39 Record Drawings: Reproducible drawings (or Plans) prepared pursuant to the requirements of the Contract Documents that reflect all changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed upon completion of the Project. See also **As-Builts**.

1.1.40 Request for Information (or "RFI"): A written request prepared by the Contractor requesting that the Architect provide additional information necessary to clarify or amplify an item in the Contract Documents that the Contractor believes is not clearly shown or called for in the Drawings or Specifications or other portions of the Contract Documents, or to address problems that have arisen under field conditions.

1.1.41 Request for Substitution for Specified Item: A request by Contractor to substitute an equal or superior material, product, thing, or service for a specific material, product, thing, or service that has been designated in the Contract Documents by a specific brand or trade name.

1.1.42 Safety Orders: Written and/or verbal orders for construction issued by the California Division of Occupational Safety and Health ("CalOSHA") or by the United States Occupational Safety and Health Administration ("OSHA").

1.1.43 Safety Plan: Contractor's safety plan specifically adapted for the Project. Contractor's Safety Plan shall comply with all provisions regarding Project safety, including all applicable provisions in these General Conditions.

1.1.44 Samples: Physical examples that illustrate materials, products, equipment, finishes, colors, or workmanship and that, when approved in accordance with the Contract Documents, establish standards by which portions of the Work will be judged.

1.1.45 Shop Drawings: All drawings, prints, diagrams, illustrations, brochures, schedules, and other data that are prepared by the Contractor, a subcontractor, manufacturer, supplier, or distributor, that illustrate how specific portions of the Work shall be fabricated or installed.

1.1.46 Site: The Project site as shown on the Drawings.

1.1.47 Specifications: That portion of the Contract Documents, Division 1 through Division 49, and all technical sections, and addenda to all of these, if any, consisting of written descriptions and requirements of a technical nature of materials, equipment, construction methods and systems, standards, and workmanship.

1.1.48 State: The State of California.

1.1.49 Storm Water Pollution Prevention Plan (or "SWPPP"): A document which identifies sources and activities at a particular facility that may contribute pollutants to storm water and contains specific control measures and time frames to prevent or treat such pollutants.

1.1.50 Subcontractor: A contractor and/or supplier who is under contract with the Contractor or with any other subcontractor, regardless of tier, to perform a portion of the Work of the Project.

1.1.51 Submittal Schedule: The schedule of submittals as provided by Contractor and approved by District.

1.1.52 Surety: The person, firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond, and must be a California admitted surety insurer as defined in the Code of Civil Procedure section 995.120.

1.1.53 Work: All labor, materials, equipment, components, appliances, supervision, coordination, and services required by, or reasonably inferred from, the Contract Documents, that are necessary for the construction and completion of the Project.

1.2 Laws Concerning the Contract

Contract is subject to all provisions of the Constitution and laws of California and the United States governing, controlling, or affecting District, or the property, funds, operations, or powers of District, and such provisions are by this reference made a part hereof. Any provision required by law to be included in this Contract shall be deemed to be inserted.

1.3 No Oral Agreements

No oral agreement or conversation with any officer, agent, or employee of District, either before or after execution of Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract.

1.4 No Assignment

Contractor shall not assign this Contract or any part thereof including, without limitation, any Work or money to become due hereunder without the prior written consent of the

District. Assignment without District's prior written consent shall be null and void. Any assignment of money due or to become due under this Contract shall be subject to a prior lien for services rendered or material supplied for performance of work called for under this Contract in favor of all persons, firms, or corporations rendering services or supplying material to the extent that claims are filed pursuant to the Civil Code, Code of Civil Procedure, Government Code, Labor Code, and/or Public Contract Code, and shall also be subject to deductions for liquidated damages or withholding of payments as determined by District in accordance with this Contract. Contractor shall not assign or transfer in any manner to a Subcontractor or supplier the right to prosecute or maintain an action against the District.

1.5 Notice and Service Thereof

1.5.1 Any notice from one party to the other or otherwise under Contract shall be in writing and shall be dated and signed by the party giving notice or by a duly authorized representative of that party. Any notice shall not be effective for any purpose whatsoever unless served in one of the following manners:

1.5.1.1 If notice is given by personal delivery thereof, it shall be considered delivered on the day of delivery.

1.5.1.2 If notice is given by overnight delivery service, it shall be considered delivered one (1) day after date deposited, as indicated by the delivery service.

1.5.1.3 If notice is given by depositing same in United States mail, enclosed in a sealed envelope, it shall be considered delivered three (3) days after date deposited, as indicated by the postmarked date.

1.5.1.4 If notice is given by registered or certified mail with postage prepaid, return receipt requested, it shall be considered delivered on the day the notice is signed for.

1.5.1.5 Electronic mail may be used for convenience but is not a substitute for the notice and service requirements herein.

1.6 No Waiver

The failure of District in any one or more instances to insist upon strict performance of any of the terms of this Contract or to exercise any option herein conferred shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion. No action or failure to act by the District, Architect, or Construction Manager shall constitute a waiver of any right or duty afforded the District under the Contract, nor shall any action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

1.7 Substitutions for Specified Items

Unless the Special Conditions contain different provisions, Contractor shall not substitute different items for any items identified in the Contract Documents without prior written approval of the District.

1.8 Materials and Work

1.8.1 Except as otherwise specifically stated in this Contract, Contractor shall provide and pay for all materials, labor, tools, equipment, transportation, supervision, temporary constructions of every nature, and all other services, management, and facilities of every nature whatsoever necessary to execute and complete this Contract, in a good and workmanlike manner, within the Contract Time.

1.8.2 Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and grades as noted or specified, workmanship shall be of good quality, and Contractor shall use all diligence to inform itself fully as to the required manufacturer's instructions and to comply therewith.

1.8.3 Materials shall be furnished in ample quantities and at such times as to ensure uninterrupted progress of Work and shall be stored properly and protected from the elements, theft, vandalism, or other loss or damage as required.

1.8.4 For all materials and equipment specified or indicated in the Drawings, the Contractor shall provide all labor, materials, equipment, and services necessary for complete assemblies and complete working systems, functioning as intended. Incidental items not indicated on Drawings, nor mentioned in the Specifications, that can legitimately and reasonably be inferred to belong to the Work described, or be necessary in good practice to provide a complete assembly or system, shall be furnished as though itemized here in every detail. In all instances, material and equipment shall be installed in strict accordance with each manufacturer's most recent published recommendations and specifications.

1.8.5 Contractor shall, after award of Contract by District and after relevant submittals have been approved, place orders for materials and/or equipment as specified so that delivery of same may be made without delays to the Work. Contractor shall, upon five (5) days' demand from District, present documentary evidence showing that orders have been placed.

1.8.6 District reserves the right but has no obligation, in response to Contractor's neglect or failure in complying with the above instructions, to place orders for such materials and/or equipment as the District may deem advisable in order that the Work may be completed at the date specified in the Contract, and all expenses incidental to the procuring of said materials and/or equipment shall be paid for by Contractor or deducted from payment(s) to Contractor.

1.8.7 Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver the Site to District, together with all improvements and appurtenances constructed or placed thereon by it, and free from any claims, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any work covered by the Contract shall have any right to lien any portion of the Premises or any improvement or appurtenance thereon, except that Contractor may install metering devices or other equipment of utility companies or of political subdivision, title to which is commonly retained by utility company or political subdivision. In the event of installation of any such metering device or equipment, Contractor shall advise District as to owner thereof.

1.8.7.1 If a lien or a claim based on a stop payment notice of any nature should at any time be filed against the Work or any District property, by any entity that has supplied material or services at the request of the Contractor, Contractor and Contractor's Surety shall promptly, on demand by District and at Contractor's and Surety's own expense, take any and all action necessary to cause any such lien or a claim based on a stop payment notice to be released or discharged immediately therefrom.

1.8.7.2 If the Contractor fails to furnish to the District within ten (10) calendar days after demand by the District, satisfactory evidence that a lien or a claim based on a stop payment notice has been so released, discharged, or secured, the District may discharge such indebtedness and deduct the amount required therefor, together with any and all losses, costs, damages, and attorney's fees and expense incurred or suffered by District from any sum payable to Contractor under the Contract.

1.8.8 Nothing contained in this Article, however, shall defeat or impair the rights of persons furnishing materials or labor under any bond given by Contractor for their protection or any rights under any law permitting such protection or any rights under any law permitting such persons to look to funds due Contractor in hands of District (e.g., stop payment notices), and this provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such material.

1.8.9 Title to new materials and/or equipment for the Work of this Contract and attendant liability for its protection and safety shall remain with Contractor until incorporated in the Work of this Contract and accepted by District. No part of any materials and/or equipment shall be removed from its place of storage except for immediate installation in the Work of this Contract. Should the District, in its discretion, allow the Contractor to store materials and/or equipment for the Work off-site, Contractor will store said materials and/or equipment at a bonded warehouse and with appropriate insurance coverage at no cost to District. Contractor shall keep an accurate inventory of all materials and/or equipment in a manner satisfactory to District or its authorized representative and shall, at the District's request, forward it to the District.

2. [RESERVED]

3. ARCHITECT

3.1 The Architect shall represent the District during the Project and will observe the progress and quality of the Work on behalf of the District. Architect shall have the authority to act on behalf of District to the extent expressly provided in the Contract Documents and to the extent determined by District. Architect shall have authority to reject materials, workmanship, and/or the Work whenever rejection may be necessary, in Architect's reasonable opinion, to ensure the proper execution of the Contract.

3.2 Architect shall, with the District and on behalf of the District, determine the amount, quality, acceptability, and fitness of all parts of the Work, and interpret the Specifications, Drawings, and shall, with the District, interpret all other Contract Documents.

3.3 Architect shall have all authority and responsibility established by law, including title 24 of the California Code of Regulations.

3.4 Contractor shall provide District and the Construction Manager with a copy of all written communication between Contractor and Architect at the same time as that communication is made to Architect, including, without limitation, all RFIs, correspondence, submittals, claims, and proposed change orders.

4. CONSTRUCTION MANAGER

4.1 If a Construction Manager is used on this Project ("Construction Manager" or "CM"), the Construction Manager will provide administration of the Contract on the District's behalf. After execution of the Contract and Notice to Proceed, all correspondence and/or instructions from Contractor and/or District shall be forwarded through the Construction Manager. The Construction Manager will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences, or procedures or for safety precautions in connection with the Work, which shall all remain the Contractor's responsibility.

4.2 The Construction Manager, however, will have authority to reject materials and/or workmanship not conforming to the Contract Documents, as determined by the District, the Architect, and/or the Project Inspector. The Construction Manager shall also have the authority to require special inspection or testing of any portion of the Work, whether it has been fabricated, installed, or fully completed. Any decision made by the Construction Manager, in good faith, shall not give rise to any duty or responsibility of the Construction Manager to: the Contractor; any Subcontractor; the Contractor or Subcontractor's respective agents, employees; or other persons performing any of the Work. The Construction Manager shall have free access to any or all parts of Work at any time.

4.3 If the District does not use a Construction Manager on this Project, all references within the Contract Documents to Construction Manager or CM shall be read as District.

5. INSPECTOR, INSPECTIONS, AND TESTS

5.1 Project Inspector

5.1.1 One or more Project Inspector(s), including special Project Inspector(s), as required, will be assigned to the Work by District, in accordance with requirements of title 24, part 1, of the California Code of Regulations, to enforce the building code and monitor compliance with Plans and Specifications for the Project previously approved by the DSA. Duties of Project Inspector(s) are specifically defined in section 4-342 of said part 1 of title 24.

5.1.2 No Work shall be carried on except with the knowledge and under the inspection of the Project Inspector(s). The Project Inspector(s) shall have free access to any or all parts of Work at any time. Contractor shall furnish Project Inspector(s) reasonable opportunities for obtaining such information as may be necessary to keep Project Inspector(s) fully informed respecting progress and manner of work and character of materials, including, but not limited to, submission of form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector at least 48 hours in advance of the

commencement and completion of construction of each and every aspect of the Work. Forms are available on the DSA's website at: <http://www.dgs.ca.gov/dsa/Forms.aspx>. Inspection of Work shall not relieve Contractor from an obligation to fulfill this Contract. Project Inspector(s) and the DSA are authorized to suspend work whenever the Contractor and/or its Subcontractor(s) are not complying with the Contract Documents. Any work stoppage by the Project Inspector(s) and/or DSA shall be without liability to the District. Contractor shall instruct its Subcontractors and employees accordingly.

5.1.3 If Contractor and/or any Subcontractor requests that the Project Inspector(s) perform any inspection off-site, this shall only be done if it is allowable pursuant to applicable regulations and DSA approval, if the Project Inspector(s) agree to do so, and at the expense of the Contractor.

5.2 Tests and Inspections

5.2.1 Tests and Inspections shall comply with title 24, part 1, California Code of Regulations, group 1, article 5, section 4-335, and with the provisions of the Specifications.

5.2.2 The District will select an independent testing laboratory to conduct the tests. Selection of the materials required to be tested shall be by the laboratory or the District's representative and not by the Contractor. The Contractor shall notify the District's representative a sufficient time in advance of its readiness for required observation or inspection.

5.2.3 The Contractor shall notify the District's representative a sufficient time in advance of the manufacture of material to be supplied under the Contract Documents, which must by terms of the Contract Documents be tested, in order that the District may arrange for the testing of same at the source of supply. This notice shall be provided, at a minimum, seventy-two (72) hours prior to the manufacture of the material that needs to be tested.

5.2.4 Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated into and/or onto the Project.

5.2.5 The District will select the testing laboratory and pay for the costs of all tests and inspections, excepting those inspections performed at Contractor's request and expense. Contractor shall reimburse the District for any and all laboratory costs or other testing costs for any materials found to be not in compliance with the Contract Documents. At the District's discretion, District may elect to deduct laboratory or other testing costs for noncompliant materials from the Contract Price, and such deduction shall not constitute a withholding.

5.3 Costs for After Hours and/or Off Site Inspections

If the Contractor performs Work outside the Inspector's regular working hours or requests the Inspector to perform inspections off Site, costs of any inspections required outside regular working hours or off Site shall be borne by the Contractor and may be invoiced to the Contractor by the District or the District may deduct those expenses from the next Progress Payment.

6. CONTRACTOR

Contractor shall construct and complete, in a good and workmanlike manner, the Work for the Contract Price including any adjustment(s) to the Contract Price pursuant to provisions herein regarding changes to the Contract Price. Except as otherwise noted, Contractor shall provide and pay for all labor, materials, equipment, permits (excluding DSA), fees, licenses, facilities, transportation, taxes, bonds and insurance, and services necessary for the proper execution and completion of the Work, except as indicated herein.

6.1 Status of Contractor

6.1.1 Contractor is and shall at all times be deemed to be an independent contractor and shall be wholly responsible for the manner in which it and its Subcontractors perform the services required of it by the Contract Documents. Nothing herein contained shall be construed as creating the relationship of employer and employee, or principal and agent, between the District, or any of the District's employees or agents, and Contractor or any of Contractor's Subcontractors, agents or employees. Contractor assumes exclusively the responsibility for the acts of its agents, and employees as they relate to the services to be provided during the course and scope of their employment. Contractor, its Subcontractors, agents, and its employees shall not be entitled to any rights or privileges of District employees. District shall be permitted to monitor the Contractor's activities to determine compliance with the terms of this Contract.

6.1.2 As required by law, Contractor and all Subcontractors shall be properly licensed and regulated by the Contractors State License Board, 9821 Business Park Drive, Sacramento, California 95827, <http://www.cslb.ca.gov>.

6.1.3 As required by law, Contractor and all Subcontractors shall be properly registered as public works contractors by the Department of Industrial Relations at: <https://efiling.dir.ca.gov/PWCR/ActionServlet?action=displayPWCRRegistrationForm> or current URL.

6.1.4 Contractor represents that it has no existing interest and will not acquire any interest, direct or indirect, which could conflict in any manner or degree with the performance of the Work required under this Contract and that no person having any such interest shall be employed by Contractor.

6.2 Project Inspection Card(s)

Contractor shall verify that forms DSA 152 (or the current version applicable at the time the Work is performed) are issued for the Project prior to the commencement of construction.

6.3 Contractor's Supervision

6.3.1 During progress of the Work, Contractor shall keep on the Premises, and at all other locations where any Work related to the Contract is being performed, an experienced and competent project manager and construction superintendent who are employees of the Contractor, to whom the District does not object and at least one of whom shall be fluent in English, written and verbal.

6.3.2 The project manager and construction superintendent shall both speak fluently the predominant language of the Contractor's employees.

6.3.3 Before commencing the Work herein, Contractor shall give written notice to District of the name of its project manager and construction superintendent. Neither the Contractor's project manager nor construction superintendent shall be changed except with prior written notice to District. If the Contractor's project manager and/or construction superintendent proves to be unsatisfactory to Contractor, or to District, any of the District's employees, agents, the Construction Manager, or the Architect, the unsatisfactory project manager and/or construction superintendent shall be replaced. However, Contractor shall notify District in writing before any change occurs, but no less than two (2) business days prior. Any replacement of the project manager and/or construction superintendent shall be made promptly and must be satisfactory to the District. The Contractor's project manager and construction superintendent shall each represent Contractor, and all directions given to Contractor's project manager and/or construction superintendent shall be as binding as if given to Contractor.

6.3.4 Contractor shall give efficient supervision to Work, using its best skill and attention. Contractor shall carefully study and compare all Contract Documents, Drawings, Specifications, and other instructions and shall at once report to District, Construction Manager, and Architect any error, inconsistency, or omission that Contractor or its employees and Subcontractors may discover, in writing, with a copy to District's Project Inspector(s). The Contractor shall have responsibility for discovery of errors, inconsistencies, or omissions.

6.4 Duty to Provide Fit Workers

6.4.1 Contractor and Subcontractor(s) shall at all times enforce strict discipline and good order among their employees and shall not employ or work any unfit person or anyone not skilled in work assigned to that person. It shall be the responsibility of Contractor to ensure compliance with this requirement. District may require Contractor to permanently remove unfit persons from Project Site.

6.4.2 Any person in the employ of Contractor or Subcontractor(s) whom District may deem incompetent or unfit shall be excluded from working on the Project and shall not again be employed on the Project except with the prior written consent of District.

6.4.3 The Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work.

6.4.4 If Contractor intends to make any change in the name or legal nature of the Contractor's entity, Contractor must first notify the District in writing prior to making any contemplated change. The District shall determine in writing if Contractor's intended change is permissible while performing this Contract.

6.5 Field Office

6.5.1 Contractor shall provide a temporary office on the Site for the District's use exclusively, during the term of the Contract.

6.6 Purchase of Materials and Equipment

The Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from District to assure that there will be no delays.

6.7 Documents on Work

6.7.1 Contractor shall at all times keep on the Site, or at another location as the District may authorize in writing, one (1) legible copy of all Contract Documents, including Addenda and Change Orders, and Titles 19 and 24 of the California Code of Regulations, the specified edition(s) of the Uniform Building Code, all approved Drawings, Plans, Schedules, and Specifications, and all codes and documents referred to in the Specifications, and made part thereof. These documents shall be kept in good order and available to District, Construction Manager, Architect, Architect's representatives, the Project Inspector(s), and all authorities having jurisdiction. Contractor shall be acquainted with and comply with the provisions of these titles as they relate to this Project. (See particularly the duties of Contractor, Title 24, Part 1, California Code of Regulations, section 4-343.) Contractor shall also be acquainted with and comply with all California Code of Regulations provisions relating to conditions on this Project, particularly Titles 8 and 17. Contractor shall coordinate with Architect and Construction Manager and shall submit its verified report(s) according to the requirements of Title 24.

6.7.2 Daily Job Reports.

6.7.2.1 Contractor shall maintain, at a minimum, at least one (1) set of Daily Job Reports on the Project. These must be prepared by the Contractor's employee(s) who are present on Site, and must include, at a minimum, the following information:

- 6.7.2.1.1** A brief description of all Work performed on that day.
- 6.7.2.1.2** A summary of all other pertinent events and/or occurrences on that day.
- 6.7.2.1.3** The weather conditions on that day.
- 6.7.2.1.4** A list of all Subcontractor(s) working on that day, including DIR registration numbers.
- 6.7.2.1.5** A list of each Contractor employee working on that day and the total hours worked for each employee.
- 6.7.2.1.6** A complete list of all equipment on Site that day, whether in use or not.
- 6.7.2.1.7** A complete list of all materials, supplies, and equipment delivered on that day.
- 6.7.2.1.8** A complete list of all inspections and tests performed on that day.

6.7.2.2 Each day Contractor shall provide a copy of the previous day's Daily Job Report to the District or the Construction Manager.

6.8 Preservation of Records

Contractor shall maintain, and District shall have the right to inspect, Contractor's financial records for the Project, including, without limitation, Job Cost Reports for the

Project in compliance with the criteria set forth herein. The District shall have the right to examine and audit all Daily Job Reports or other Project records of Contractor's project manager(s), project superintendent(s), and/or project foreperson(s), all certified payroll records and/or related documents including, without limitation, Job Cost Reports, payroll, payment, timekeeping and tracking documents; all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports, and other data of the Contractor, any Subcontractor, and/or supplier, including computations and projections related to bidding, negotiating, pricing, or performing the Work or Contract modification, in order to evaluate the accuracy, completeness, and currency of the cost, manpower, coordination, supervision, or pricing data at no additional cost to the District. These documents may be duplicative and/or be in addition to any Bid Documents held in escrow by the District. The Contractor shall make available at its office at all reasonable times the materials described in this paragraph for the examination, audit, or reproduction until three (3) years after final payment under this Contract. Notwithstanding the provisions above, Contractor shall provide any records requested by any governmental agency, if available, after the time set forth above.

6.9 Integration of Work

6.9.1 Contractor shall do all cutting, fitting, patching, and preparation of Work as required to make its several parts come together properly, to fit it to receive or be received by work of other contractors, and to coordinate tolerances to various pieces of work, showing upon, or reasonably implied by, the Drawings and Specifications for the completed structure, and shall conform them as District and/or Architect may direct.

6.9.2 Contractor shall make its own layout of lines and elevations and shall be responsible for the accuracy of both Contractor's and Subcontractors' work resulting therefrom.

6.9.3 Contractor and all Subcontractors shall take all field dimensions required in performance of the Work, and shall verify all dimensions and conditions on the Site. All dimensions affecting proper fabrication and installation of all Work must be verified prior to fabrication by taking field measurements of the true conditions. If there are any discrepancies between dimensions in drawings and existing conditions which will affect the Work, Contractor shall bring such discrepancies to the attention of the District and Architect for adjustment before proceeding with the Work. In doing so, it is recognized that Contractor is not acting in the capacity of a licensed design professional, and that Contractor's examination is made in good faith to facilitate construction and does not create an affirmative responsibility of a design professional to detect errors, omissions or inconsistencies in the Contract Documents or to ascertain compliance with applicable laws, building codes or regulations. However, nothing in this provision shall abrogate Contractor's responsibilities for discovering and reporting any error, inconsistency, or omission pursuant to the Contract within the Contractor's standard of care including, without limitation, any applicable laws, ordinance, rules, or regulations. Following receipt of written notice from Contractor, the District and/or Architect shall inform Contractor what action, if any, Contractor shall take with regard to such discrepancies.

6.9.4 All costs caused by noncompliant, defective, or delayed Work shall be borne by Contractor, inclusive of repair work.

6.9.5 Contractor shall not endanger any work performed by it or anyone else by cutting, excavating, or otherwise altering work and shall not cut or alter work of any other contractor except with consent of District.

6.10 Notifications

6.10.1 Contractor shall notify the Architect and Project Inspector, in writing, of the commencement of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector. Forms are available on the DSA's website at: <http://www.dgs.ca.gov/dsa/Forms.aspx>.

6.10.2 Contractor shall notify the Architect and Project Inspector, in writing, of the completion of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or current version) to the Project Inspector.

6.11 Obtaining of Permits, Licenses and Registrations

Contractor shall secure and pay for all permits (except DSA), licenses, registrations, approvals and certificates necessary for prosecution of Work, including but not limited to those listed in the Special Conditions, if any, before the date of the commencement of the Work or before the permits, licenses, registrations, approvals and certificates are legally required to continue the Work without interruption. The Contractor shall obtain and pay, only when legally required, for all licenses, registrations, approvals, permits, inspections, and inspection certificates required to be obtained from or issued by any authority having jurisdiction over any part of the Work included in the Contract. All final permits, licenses, registrations, approvals and certificates shall be delivered to District before demand is made for final payment.

6.12 Royalties and Patents

6.12.1 Contractor shall obtain and pay, only when legally required, all royalties and license fees necessary for prosecution of Work before the earlier of the date of the commencement of the Work or the date that the license is legally required to continue the Work without interruption. Contractor shall defend suits or claims of infringement of patent, copyright, or other rights and shall hold the District, the Architect, and the Construction Manager harmless and indemnify them from loss on account thereof except when a particular design, process, or make or model of product is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process, or product is an infringement of a patent or copyright, the Contractor shall indemnify and defend the District, Architect and Construction Manager against any loss or damage unless the Contractor promptly informs the District of its information.

6.12.2 The review by the District or Architect of any method of construction, invention, appliance, process, article, device, or material of any kind shall be only its adequacy for the Work and shall not approve use by the Contractor in violation of any patent or other rights of any person or entity.

6.13 Work to Comply With Applicable Laws and Regulations

6.13.1 Contractor shall give all notices and comply with the following specific laws, ordinances, rules, and regulations and all other applicable laws, ordinances, rules, and regulations bearing on conduct of Work as indicated and specified, including but not limited to the appropriate statutes and administrative code sections. If Contractor observes that Drawings and Specifications are at variance therewith, or should Contractor become aware of the development of conditions not covered by Contract Documents that may result in finished Work being at variance therewith, Contractor shall promptly notify District in writing and any changes deemed necessary by District shall be made as provided in Contract for changes in Work.

6.13.1.1 National Electrical Safety Code, U. S. Department of Commerce

6.13.1.2 National Board of Fire Underwriters' Regulations

6.13.1.3 International Building Code, latest addition, and the California Code of Regulations, title 24, and other amendments

6.13.1.4 Manual of Accident Prevention in Construction, latest edition, published by A.G.C. of America

6.13.1.5 Industrial Accident Commission's Safety Orders, State of California

6.13.1.6 Regulations of the State Fire Marshall (title 19, California Code of Regulations) and Pertinent Local Fire Safety Codes

6.13.1.7 Americans with Disabilities Act

6.13.1.8 Education Code of the State of California

6.13.1.9 Government Code of the State of California

6.13.1.10 Labor Code of the State of California, division 2, part 7, Public Works and Public Agencies

6.13.1.11 Public Contract Code of the State of California

6.13.1.12 California Art Preservation Act

6.13.1.13 U. S. Copyright Act

6.13.1.14 U. S. Visual Artists Rights Act

6.13.2 Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act (Public Resources Code section 21000 et seq.).

6.13.3 If Contractor performs any Work that it knew, or through exercise of reasonable care should have known, to be contrary to any applicable laws, ordinance, rules, or regulations, Contractor shall bear all costs arising therefrom and arising from the correction of said Work.

6.13.4 Where Specifications or Drawings state that materials, processes, or procedures must be approved by the DSA, State Fire Marshall, or other body or agency, Contractor shall be responsible for satisfying requirements of such bodies or agencies applicable at the time the Work is performed, and as determined by those bodies or agencies.

6.14 Safety/Protection of Persons and Property

6.14.1 The Contractor will be solely and completely responsible for conditions of the Site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours.

6.14.2 The wearing of hard hats will be mandatory at all times for all personnel on Site. Contractor shall supply sufficient hard hats to properly equip all employees and visitors.

6.14.3 Any construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Site.

6.14.4 Implementation and maintenance of safety programs shall be the sole responsibility of the Contractor.

6.14.5 The Contractor shall furnish to the District a copy of the Contractor's safety plan within the time frame indicated in the Contract Documents and specifically adapted for the Project.

6.14.6 Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Contract and shall take all necessary measures and be responsible for the proper care and completion and final acceptance by District. All Work shall be solely at Contractor's risk with the exception of damage to the Work caused by "acts of God" as defined in Public Contract Code section 7105.

6.14.7 Contractor shall take, and require Subcontractors to take, all necessary precautions for safety of workers on the Project and shall comply with all applicable federal, state, local, and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. Contractor shall furnish, erect, and properly maintain at all times, all necessary safety devices, safeguards, construction canopies, signs, nets, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of construction.

6.14.8 Hazards Control – Contractor shall store volatile wastes in covered metal containers and remove them from the Site daily. Contractor shall prevent accumulation of wastes that create hazardous conditions. Contractor shall provide adequate ventilation during use of volatile or noxious substances.

6.14.9 Contractor shall designate a responsible member of its organization on the Project, whose duty shall be to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to

comply with reporting and other occupational safety requirements, and to protect the life, safety, and health of workers. Name and position of person so designated shall be reported to District by Contractor.

6.14.10 Contractor shall correct any violations of safety laws, rules, orders, standards, or regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health, Contractor shall correct such violation promptly.

6.14.11 Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

6.14.12 In an emergency affecting safety of life or of work or of adjoining property, Contractor, without special instruction or authorization, shall act, at its discretion, to prevent such threatened loss or injury. Any compensation claimed by Contractor on account of emergency work shall be determined by agreement.

6.14.13 All salvage materials will become the property of the Contractor and shall be removed from the Site unless otherwise called for in the Contract Documents. However, the District reserves the right to designate certain items of value that shall be turned over to the District unless otherwise directed by District.

6.14.14 All connections to public utilities and/or existing on-site services shall be made and maintained in such a manner as to not interfere with the continuing use of same by the District during the entire progress of the Work.

6.14.15 Contractor shall provide such heat, covering, and enclosures as are necessary to protect all Work, materials, equipment, appliances, and tools against damage by weather conditions, such as extreme heat, cold, rain, snow, dry winds, flooding, or dampness.

6.14.16 The Contractor shall protect and preserve the Work from all damage or accident, providing any temporary roofs, window and door coverings, boxings, or other construction as required by the Architect. The Contractor shall be responsible for existing structures, walks, roads, trees, landscaping, and/or improvements in working areas; and shall provide adequate protection therefore. If temporary removal is necessary of any of the above items, or damage occurs due to the Work, the Contractor shall replace same at its expense with same kind, quality, and size of Work or item damaged. This shall include any adjoining property of the District and others.

6.14.17 Contractor shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property, and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations.

6.14.18 Contractor shall confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits, or directions of Architect, and shall not interfere with the Work or unreasonably encumber Premises or overload any structure with materials. Contractor shall enforce all instructions of District and Architect regarding signs, advertising, fires, and smoking, and require that all workers comply with all regulations while on Project Site.

6.14.19 Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, or any person associated with the Work shall conduct themselves in a manner appropriate for a school site. No verbal or physical contact with neighbors, students, and faculty, profanity, or inappropriate attire or behavior will be permitted. District may require Contractor to permanently remove non-complying persons from Project Site.

6.14.20 Contractor shall take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed, Contractor shall have a civil engineer, registered as a professional engineer in California, replace them at no cost to District.

6.14.21 In the event that the Contractor enters into any agreement with owners of any adjacent property to enter upon the adjacent property for the purpose of performing the Work, Contractor shall fully indemnify, defend, and hold harmless each person, entity, firm, or agency that owns or has any interest in adjacent property. The form and content of the agreement of indemnification shall be approved by the District prior to the commencement of any Work on or about the adjacent property. The Contractor shall also indemnify the District as provided in the indemnification provision herein. These provisions shall be in addition to any other requirements of the owners of the adjacent property.

6.15 Working Evenings and Weekends

Contractor may be required to work increased hours, evenings, and/or weekends at no additional cost to the District. Contractor shall give the District seventy-two (72) hours' notice prior to performing any evening and/or weekend work. Contractor shall perform all evening and/or weekend work only upon District's approval and in compliance with all applicable rules, regulations, laws, and local ordinances including, without limitation, all noise and light limitations. Contractor shall reimburse the District for any increased or additional Inspector charges as a result of Contractor's increased hours, or evening and/or weekend work.

6.16 Cleaning Up

6.16.1 The Contractor shall provide all services, labor, materials, and equipment necessary for protecting and securing the Work, all school occupants, furnishings, equipment, and building structure from damage until its completion and final acceptance by District. Dust barriers shall be provided to isolate dust and dirt from construction operations. At completion of the Work and portions thereof, Contractor shall clean to the original state any areas beyond the Work area that become dust laden as a result of the Work. The Contractor must erect the necessary warning signs and barricades to ensure the safety of all school occupants. The Contractor at all times must maintain good housekeeping practices to reduce the risk of fire damage and must make a fire extinguisher, fire blanket, and/or fire watch, as applicable, available at each location where cutting, braising, soldering, and/or welding is being performed or where there is an increased risk of fire.

6.16.2 Contractor at all times shall keep Premises, including property immediately adjacent thereto, free from debris such as waste, rubbish (including personal rubbish of workers, e.g., food wrappers, etc.), and excess materials and equipment caused by the Work. Contractor shall not leave debris under, in, or about the Premises (or surrounding property or neighborhood), but shall promptly remove

same from the Premises on a daily basis. If Contractor fails to clean up, District may do so and the cost thereof shall be charged to Contractor. If Contract is for work on an existing facility, Contractor shall also perform specific clean-up on or about the Premises upon request by the District as it deems necessary for continued operations. Contractor shall comply with all related provisions of the Specifications.

6.16.3 If the Construction Manager, Architect, or District observes the accumulation of trash and debris, the District will give the Contractor a 24-hour written notice to mitigate the condition.

6.16.4 Should the Contractor fail to perform the required clean-up, or should the clean-up be deemed unsatisfactory by the District, the District may, at its sole discretion, then perform the clean-up. All cost associated with the clean-up work (including all travel, payroll burden, and costs for supervision) will be deducted from the Contract Price.

7. SUBCONTRACTORS

7.1 Contractor shall provide the District with information for all Subcontracts as indicated in the Contractor's Submittals and Schedules Section herein.

7.2 No contractual relationship exists between the District and any Subcontractor, supplier, or sub-subcontractor by reason of this Contract.

7.3 Contractor agrees to bind every Subcontractor by terms of this Contract as far as those terms that are applicable to Subcontractor's work including, without limitation, all labor, wage & hour, apprentice and related provisions and requirements. If Contractor shall subcontract any part of this Contract, Contractor shall be as fully responsible to District for acts and omissions of any Subcontractor and of persons either directly or indirectly employed by any Subcontractor, including Subcontractor caused Project delays, as it is for acts and omissions of persons directly employed by Contractor. The divisions or sections of the Specifications and/or the arrangement of the drawings are not intended to control the Contractor in dividing the Work among Subcontractors or limit the work performed by any trade.

7.4 District's consent to, or approval of, or failure to object to, any Subcontractor under this Contract shall not in any way relieve Contractor of any obligations under this Contract and no such consent shall be deemed to waive any provisions of this Contract.

7.5 Contractor is directed to familiarize itself with sections 4100 through 4114 of the Public Contract Code of the State of California, as regards subletting and subcontracting, and to comply with all applicable requirements therein. In addition, Contractor is directed to familiarize itself with sections 1720 through 1861 of the Labor Code of the State of California, as regards the payment of prevailing wages and related issues, and to comply with all applicable requirements therein including, without limitation, section 1775 and the Contractor's and Subcontractors' obligations and liability for violations of prevailing wage law and other applicable laws.

7.6 No Contractor whose Bid is accepted shall, without consent of the awarding authority and in full compliance with section 4100 et seq. of the Public Contract Code,

including, without limitation, sections 4107, 4107.5, and 4109 of the Public Contract Code, and section 1771.1 of the Labor Code, either:

7.6.1 Substitute any person as a Subcontractor in place of the Subcontractor designated in the original Bid; or

7.6.2 Permit any Subcontract to be assigned or transferred, or allow any portion of the Work to be performed by anyone other than the original Subcontractor listed in the Bid; or

7.6.3 Sublet or subcontract any portion of the Work in excess of one-half of one percent (0.5%) of the Contractor's total bid as to which its original bid did not designate a Subcontractor.

7.7 The Contractor shall be responsible for the coordination of the trades, Subcontractors, sub-subcontractors, and material or equipment suppliers working on the Project.

7.7.1 Contractor is responsible for ensuring that all Subcontractors are properly registered as public works contractors by the Department of Industrial Relations.

7.8 Contractor is solely responsible for settling any differences between the Contractor and its Subcontractor(s) or between Subcontractors.

7.9 Contractor must include in all of its subcontracts the assignment provisions as indicated in the Termination section of these General Conditions.

8. OTHER CONTRACTS/CONTRACTORS

8.1 District reserves the right to let other contracts, and/or to perform work with its own forces, in connection with the Project. Contractor shall afford other contractors reasonable opportunity for introduction and storage of their materials and execution of their work and shall properly coordinate and connect Contractor's Work with the work of other contractors.

8.2 In addition to Contractor's obligation to protect its own Work, Contractor shall protect the work of any other contractor that Contractor encounters while working on the Project.

8.3 If any part of Contractor's Work depends for proper execution or results upon work of District or any other contractor, the Contractor shall inspect and, before proceeding with its Work, promptly report to the District in writing any defects in District's or any other contractor's work that render Contractor's Work unsuitable for proper execution and results. Contractor shall be held accountable for damages to District for District's or any other contractor's work that Contractor failed to inspect or should have inspected. Contractor's failure to inspect and report shall constitute Contractor's acceptance of all District's or any other contractor's work as fit and proper for reception of Contractor's Work, except as to defects that may develop in District's or any other contractor's work after execution of Contractor's Work and not caused by execution of Contractor's Work.

8.4 To ensure proper execution of its subsequent work, Contractor shall measure and inspect work already in place and shall at once report to the District in writing any discrepancy between that executed work and the Contract Documents.

8.5 Contractor shall ascertain to its own satisfaction the scope of the Project and nature of District's or any other contracts that have been or may be awarded by District in prosecution of the Project to the end that Contractor may perform this Contract in light of the other contracts, if any.

8.6 Nothing herein contained shall be interpreted as granting to Contractor exclusive occupancy of the Site, the Premises, or of the Project. Contractor shall not cause any unnecessary hindrance or delay to the use and/or operation(s) of the Premises and/or to District or any other contractor working on the Project. If simultaneous execution of any contract or Premises operation is likely to cause interference with performance of Contractor's Contract, Contractor shall coordinate with

those contractor(s), person(s), and/or entity(s) and shall notify the District of the resolution.

9. DRAWINGS AND SPECIFICATIONS

9.1 A complete list of all Drawings that form a part of the Contract is to be found as an index on the Drawings themselves, and/or may be provided to the Contractor and/or in the Table of Contents.

9.2 Materials or Work described in words that so applied have a well-known technical or trade meaning shall be deemed to refer to recognized standards, unless noted otherwise.

9.3 Trade Name or Trade Term. It is not the intention of this Contract to go into detailed descriptions of any materials and/or methods commonly known to the trade under "trade name" or "trade term." The mere mention or notation of "trade name" or "trade term" shall be considered a sufficient notice to Contractor that it will be required to complete the work so named, complete, finished, and operable, with all its appurtenances, according to the best practices of the trade.

9.4 The naming of any material and/or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and/or labor therefor, as per best practices of the trade(s) involved, unless specifically noted otherwise.

9.5 Contract Documents are complementary, and what is called for by one shall be binding as if called for by all. As such, Drawings and Specifications are intended to be fully cooperative and to agree. However, if Contractor observes that Drawings and Specifications are in conflict with the Contract Documents, Contractor shall promptly notify District and Architect in writing, and any necessary changes shall be made as provided in the Contract Documents.

9.6 In the case of discrepancy or ambiguity in the Contract Documents, the order of precedence in the Agreement shall prevail. However, in the case of discrepancy or ambiguity solely between and among the Drawings and Specifications, the discrepancy or ambiguity shall be resolved in favor of the interpretation that will provide District with the functionally complete and operable Project described in the Drawings and Specifications. In case of ambiguity, conflict, or lack of information, District will furnish clarifications with reasonable promptness.

9.7 Drawings and Specifications are intended to comply with all laws, ordinances, rules, and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, the laws, ordinances, rules, and regulations shall be considered as a part of the Contract within the limits specified. Contractor shall bear all expense of correcting work done contrary to said laws, ordinances, rules, and regulations.

9.9 As required by Section 4-317(c), Part 1, Title 24, CCR: "Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the DSA-approved documents wherein the finished work will not comply with Title 24, California Code of Regulations, a construction change document, or a

separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work.”

9.9 Ownership of Drawings

All copies of Plans, Drawings, Designs, Specifications, and copies of other incidental architectural and engineering work, or copies of other Contract Documents furnished by District, are the property of District. They are not to be used by Contractor in other work and, with the exception of signed sets of Contract Documents, are to be returned to District on request at completion of Work, or may be used by District as it may require without any additional costs to District. Neither the Contractor nor any Subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Architect. District hereby grants the Contractor, Subcontractors, sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings prepared for the Project in the execution of their Work under the Contract Documents.

10. CONTRACTOR’S SUBMITTALS AND SCHEDULES

Contractor’s submittals shall comply with the provisions and requirements of the Specifications including, without limitation Submittals.

10.1 Schedule of Work, Schedule of Submittals, and Schedule of Values

10.1.1 Within **TEN (10)** calendar days after the date of the Notice to Proceed (unless otherwise specified in the Specifications), the Contractor shall prepare and submit to the District for review, in a form supported by sufficient data to substantiate its accuracy as the District may require:

10.1.1.1 Preliminary Schedule. A preliminary schedule of construction indicating the starting and completion dates of the various stages of the Work, including any information and following any form as may be specified in the Specifications. Once approved by District, this shall become the Construction Schedule. This schedule shall include and identify all tasks that are on the Project’s critical path with a specific determination of the start and completion of each critical path task as well as all Contract milestones and each milestone’s completion date(s) as may be required by the District.

10.1.1.1.1 The District is not required to approve a preliminary schedule of construction with early completion, i.e., one that shows early completion dates for the Work and/or milestones. Contractor shall not be entitled to extra compensation if the District approves a Construction Schedule with an early completion date and Contractor completes the Project beyond the date shown in the schedule but within the Contract Time. A Construction Schedule showing the Work completed in less than the Contract Time, the time between the early completion date and the end of the Contract Time shall be Float

10.1.1.2 Preliminary Schedule of Values. A preliminary schedule of values for all of the Work, which must include quantities and prices of items aggregating the Contract Price and must subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Unless the Special Conditions contain different limits, this preliminary schedule of values

shall include, at a minimum, the following information and the following structure:

10.1.1.2.1 Divided into at least the following categories:

- 10.1.1.2.1.1** Overhead and profit;
- 10.1.1.2.1.2** Supervision;
- 10.1.1.2.1.3** General conditions;
- 10.1.1.2.1.4** Layout;
- 10.1.1.2.1.5** Mobilization;
- 10.1.1.2.1.6** Submittals;
- 10.1.1.2.1.7** Bonds and insurance;
- 10.1.1.2.1.8** Close-out/Certification documentation;
- 10.1.1.2.1.9** Demolition;
- 10.1.1.2.1.10** Installation;
- 10.1.1.2.1.11** Rough-in;
- 10.1.1.2.1.12** Finishes;
- 10.1.1.2.1.13** Testing;
- 10.1.1.2.1.14** Punchlist and District acceptance.

10.1.1.2.2 And also divided by each of the following areas:

- 10.1.1.2.2.1** Site work;
- 10.1.1.2.2.2** By each building;
- 10.1.1.2.2.3** By each floor.

10.1.1.2.3 The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

- 10.1.1.2.3.1** Mobilization and layout combined to equal not more than 1%;
- 10.1.1.2.3.2** Submittals, samples and shop drawings combined to equal not more than 3%;
- 10.1.1.2.3.3** Bonds and insurance combined to equal not more than 2%.
- 10.1.1.2.3.4** Closeout documentation shall have a value in the preliminary schedule of not less than 5%.

10.1.1.2.4 Notwithstanding any provision of the Contract Documents to the contrary, payment of the Contractor's overhead, supervision, general conditions costs, and profit, as reflected in the Cost Breakdown, shall be paid based on percentage complete, with the disbursement of Progress Payments and the Final Payment.

10.1.1.2.5 Contractor shall certify that the preliminary schedule of values as submitted to the District is accurate and reflects the costs as developed in preparing Contractor's bid. For example, without limiting the foregoing, Contractor shall not "front-load" the preliminary schedule of values with dollar amounts greater than the value of activities performed early in the Project.

10.1.1.2.6 The preliminary schedule of values shall be subject to the District's review and approval of the form and content thereof. In the event that the District objects to any portion of the preliminary schedule of values,

the District shall notify the Contractor, in writing, of the District's objection(s) to the preliminary schedule of values. Within five (5) calendar days of the date of the District's written objection(s), Contractor shall submit a revised preliminary schedule of values to the District for review and approval. The foregoing procedure for the preparation, review and approval of the preliminary schedule of values shall continue until the District has approved the entirety of the preliminary schedule of values.

10.1.1.2.7 Once the preliminary schedule of values is approved by the District, this shall become the Schedule of Values. The Schedule of Values shall not be thereafter modified or amended by the Contractor without the prior consent and approval of the District, which may be granted or withheld in the sole discretion of the District.

10.1.1.3 Preliminary Schedule of Submittals. A preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals. Once approved by District, this shall become the Submittal Schedule. All submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those submittals shall be forwarded to the District so as not to delay the Construction Schedule. Upon request by the District, Contractor shall provide an electronic copy of all submittals to the District. All submittals shall be submitted no later than 90 days after the Notice to Proceed.

10.1.1.4 Safety Plan. Contractor's Safety Plan specifically adapted for the Project. Contractor's Safety Plan shall comply with the following requirements:

10.1.1.4.1 All applicable requirements of California Division of Occupational Safety and Health ("CalOSHA") and/or of the United States Occupational Safety and Health Administration ("OSHA").

10.1.1.4.2 All provisions regarding Project safety, including all applicable provisions in these General Conditions.

10.1.1.4.3 Contractor's Safety Plan shall be in English and in the language(s) of the Contractor's and its Subcontractors' employees.

10.1.1.5 Complete Registered Subcontractors List. The name, address, telephone number, facsimile number, California State Contractors License number, classification, DIR registration number and monetary value of all Subcontracts of any tier for parties furnishing labor, material, or equipment for completion of the Project.

10.1.2 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

10.1.3 The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

10.1.4 The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.1.5 All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

10.2 Monthly Progress Schedule(s)

10.2.1 Contractor shall provide Monthly Progress Schedule(s) to the District. A Monthly Progress Schedule shall update the approved Construction Schedule or the last Monthly Progress Schedule, showing all work completed and to be completed as well as updating the Registered Subcontractors List. The monthly Progress Schedule shall be sent within the timeframe requested by the District and shall be in a format acceptable to the District and contain a written narrative of the progress of work that month and any changes, delays, or events that may affect the work. The process for District approval of the Monthly Progress Schedule shall be the same as the process for approval of the Construction Schedule.

10.2.2 Contractor shall submit Monthly Progress Schedule(s) with all payment applications.

10.2.3 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

10.2.4 The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

10.2.5 The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.2.6 All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

10.3 Material Safety Data Sheets (MSDS)

Contractor is required to ensure Material Safety Data Sheets are available in a readily accessible place at the Site for any material requiring a Material Safety Data Sheet per the federal "Hazard Communication" standard, or employees' "right to know" law. The Contractor is also required to ensure proper labeling on substances brought onto the job site and that any person working with the material or within the general area of the material is informed of the hazards of the substance and follows proper handling and protection procedures. Two additional copies of the Material Safety Data Sheets shall also be submitted directly to the District.

11. SITE ACCESS, CONDITIONS, AND REQUIREMENTS

11.1 Site Investigation

Before bidding on this Work, Contractor shall make a careful investigation of the Site and thoroughly familiarize itself with the requirements of the Contract. By the act of submitting a bid for the Work included in this Contract, Contractor shall be deemed to have made a complete study and investigation, and to be familiar with and accepted the existing conditions of the Site.

Prior to commencing the Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey. This electronic record shall serve as a basis for determining any damages caused by the Contractor during the Project. The Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.

11.2 Soils Investigation Report

11.2.1 When a soils investigation report obtained from test holes at Site or for the Project is available, that report may be available to the Contractor but shall not be a part of this Contract and shall not alleviate or excuse the Contractor's obligation to perform its own investigation. Any information obtained from that report or any information given on Drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only, is not guaranteed, does not form a part of this Contract, and Contractor may not rely thereon. By submitting its bid, Contractor acknowledges that it has made visual examination of Site and has made whatever tests Contractor deems appropriate to determine underground condition of soil. Although any such report is not a part of this Contract, recommendations from the report may be included in the Drawings, Specifications, or other Contract Documents. It is Contractor's sole responsibility to thoroughly review all Contract Documents, Drawings, and Specifications.

11.2.2 Contractor agrees that no claim against District will be made by Contractor for damages and hereby waives any rights to damages if, during progress of Work, Contractor encounters subsurface or latent conditions at Site materially differing from those shown on Drawings or indicated in Specifications, or for unknown conditions of an unusual nature that differ materially from those ordinarily encountered in the work of the character provided for in Plans and Specifications, except as indicated in the provisions of these General Conditions regarding trenches, trenching, and/or existing utility lines.

11.3 Access to Work

District and its representatives shall at all times have access to Work wherever it is in preparation or progress, including storage and fabrication. Contractor shall provide safe and proper facilities for such access so that District's representatives may perform their functions.

11.4 Layout and Field Engineering

11.4.1 All field engineering required for layout of this Work and establishing grades for earthwork operations shall be furnished by Contractor at its expense. This Work shall be done by a qualified, California-registered civil engineer approved in writing by District and Architect. Any required Record and/or As-Builts of Site development shall be prepared by the approved civil engineer.

11.4.2 The Contractor shall be responsible for having ascertained pertinent local conditions such as location, accessibility, and general character of the Site and for having satisfied itself as to the conditions under which the Work is to be performed. Contractor shall follow best practices, including but not limited to potholing to avoid utilities. District shall not be liable for any claim for allowances because of Contractor's error, failure to follow best practices, or negligence in acquainting itself with the conditions at the Site.

11.4.3 Contractor shall protect and preserve established benchmarks and monuments and shall make no changes in locations without the prior written approval of District. Contractor shall replace any benchmarks or monuments that are lost or destroyed subsequent to proper notification of District and with District's approval.

11.5 Utilities

Utilities shall be provided as indicated in the Specifications.

11.6 Sanitary Facilities

Sanitary facilities shall be provided as indicated in the Specifications.

11.7 Surveys

Contractor shall provide surveys done by a California-licensed civil engineer surveyor to determine locations of construction, grading, and site work as required to perform the Work.

11.8 Regional Notification Center

The Contractor, except in an emergency, shall contact the appropriate regional notification center at least two (2) days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement that is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the District, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and/or carried out by the Contractor unless an inquiry identification number has been assigned to the Contractor or any Subcontractor and the Contractor has given the District the identification number. Any damages arising from Contractor's failure to make appropriate notification shall be at the sole risk and expense of the Contractor. Any delays caused by failure to make appropriate notification shall be at the sole risk of the Contractor and shall not be considered for an extension of the Contract Time.

11.9 Existing Utility Lines

11.9.1 Pursuant to Government Code section 4215, District assumes the responsibility for removal, relocation, and protection of main or trunk utility lines and facilities located on the construction Site at the time of commencement of construction under this Contract with respect to any such utility facilities that are not identified in the Plans and Specifications. Contractor shall not be assessed for liquidated damages for delay in completion of the Project caused by failure of District or the owner of a utility to provide for removal or relocation of such utility facilities.

11.9.2 Locations of existing utilities provided by District shall not be considered exact, but approximate within a reasonable margin and shall not relieve Contractor of responsibilities to exercise reasonable care or costs of repair due to Contractor's failure to do so. District shall compensate Contractor for the costs of locating and repairing damage not due to the failure of Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the Plans and Specifications with reasonable accuracy, and for equipment necessarily idle during such work.

11.9.3 No provision herein shall be construed to preclude assessment against Contractor for any other delays in completion of the Work. Nothing in this Article shall be deemed to require District to indicate the presence of existing service laterals, appurtenances, or other utility lines, within the exception of main or trunk utility lines or whenever the presence of these utilities on the Site of the construction Project can be inferred from the presence of other visible facilities, such as buildings, meter junction boxes, on or adjacent to the Site of the construction.

11.9.4 If Contractor, while performing Work under this Contract, discovers utility facilities not identified by District in Contract Plans and Specifications, Contractor shall immediately notify the District and the utility in writing. The cost of repair for damage to above-mentioned visible facilities without prior written notification to the District shall be borne by the Contractor.

11.10 Notification

Contractor understands, acknowledges and agrees that the purpose of prompt notification to the District pursuant to these provisions is to allow the District to investigate the condition(s) so that the District shall have the opportunity to decide how the District desires to proceed as a result of the condition(s). Accordingly, failure of Contractor to promptly notify the District in writing, pursuant to these provisions, shall constitute Contractor's waiver of any claim for damages or delay incurred as a result of the condition(s).

11.11 Hazardous Materials

Contractor shall comply with all provisions and requirements of the Contract Documents related to hazardous materials including, without limitation, Hazardous Materials Procedures and Requirements.

11.12 No Signs

Neither the Contractor nor any other person or entity shall display any signs not required by law or the Contract Documents at the Site, fences trailers, offices, or elsewhere on the Site without specific prior written approval of the District.

12. TRENCHES

12.1 Trenches Greater Than Five Feet

Pursuant to Labor Code section 6705, if the Contract Price exceeds \$25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of excavation, promptly submit to the District and/or a registered civil or structural engineer employed by the District or Architect, a detailed plan, stamped by a licensed engineer retained by the Contractor, showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches.

12.2 Excavation Safety

If such plan varies from the Shoring System Standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said plan has been accepted by the District or by the person to whom authority to accept has been delegated by the District.

12.3 No Tort Liability of District

Pursuant to Labor Code section 6705, nothing in this Article shall impose tort liability upon the District or any of its employees.

12.4 No Excavation without Permits

The Contractor shall not commence any excavation Work until it has secured all necessary permits including the required CalOSHA excavation/shoring permit. Any permits shall be prominently displayed on the Site prior to the commencement of any excavation.

12.5 Discovery of Hazardous Waste and/or Unusual Conditions

12.5.1 Pursuant to Public Contract Code section 7104, if the Work involves digging trenches or other excavations that extend deeper than four feet below the Surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any:

12.5.1.1 Material that the Contractor believes may be material that is hazardous waste, as defined in section 25117 of the Health and Safety Code, is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

12.5.1.2 Subsurface or latent physical conditions at the Site differing from those indicated.

12.5.1.3 Unknown physical conditions at the Site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

12.5.2 The District shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work, shall issue a Change Order under the procedures described herein.

12.5.3 In the event that a dispute arises between District and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law that pertain to the resolution of disputes and protests.

13. INSURANCE AND BONDS

13.1 Insurance

Unless different provisions and/or limits are indicated in the Special Conditions, all insurance required of Contractor and/or its Subcontractor(s) shall be at least as broad as the amounts and include the provisions set forth herein.

13.1.1 Commercial General Liability and Automobile Liability Insurance

13.1.1.1 Contractor shall procure and maintain, during the life of this Contract, Commercial General Liability Insurance and Automobile Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, personal injury, death, advertising injury, and medical payments arising from, or in connection with, operations under this Contract. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 0001 11188. Contractor shall ensure that Products Liability and Completed Operations coverage, Fire Damage Liability coverage, and Automobile Liability Insurance coverage including owned, non-owned, and hired automobiles, are included within the above policies and at the required limits, or Contractor shall procure and maintain these coverages separately.

13.1.1.2 Contractor's deductible or self-insured retention for its Commercial General Liability Insurance policy shall not exceed \$25,000 unless approved in writing by District.

13.1.1.3 All such policies shall be written on an occurrence form.

13.1.2 Excess Liability Insurance

13.1.2.1 If Contractor's underlying policy limits are less than required, subject to the District's sole discretion, Contractor may procure and maintain, during the life of this Contract, an Excess Liability Insurance Policy to meet the policy limit

requirements of the required policies in order to satisfy, in the aggregate with its underlying policy, the insurance requirements herein.

13.1.2.2 There shall be no gap between the per occurrence amount of any underlying policy and the start of the coverage under the Excess Liability Insurance Policy. Any Excess Liability Insurance Policy shall be written on a following form and shall protect Contractor, District, State, Construction Manager(s), Project Manager(s), and Architect(s) in amounts and including the provisions as set forth in the Supplementary Conditions (if any) and/or Special Conditions, and that complies with all requirements for Commercial General Liability and Automobile Liability and Employers' Liability Insurance.

13.1.2.3 The District, in its sole discretion, may accept an Excess Liability Insurance Policy that brings Contractor's primary limits to the minimum requirements herein.

13.1.3 Subcontractor(s): Contractor shall require its Subcontractor(s), if any, to procure and maintain Commercial General Liability Insurance, Automobile Liability Insurance, and Excess Liability Insurance (if Subcontractor elects to satisfy, in part the insurance required herein by procuring and maintaining an Excess Liability Insurance Policy) with forms of coverage and limits equal to the amounts required of the Contractor.

13.1.4 Workers' Compensation and Employers' Liability Insurance

13.1.4.1 In accordance with provisions of section 3700 of the California Labor Code, the Contractor and every Subcontractor shall be required to secure the payment of compensation to its employees.

13.1.4.2 Contractor shall procure and maintain, during the life of this Contract, Workers' Compensation Insurance and Employers' Liability Insurance for all of its employees engaged in work under this Contract, on/or at the Site of the Project. This coverage shall cover, at a minimum, medical and surgical treatment, disability benefits, rehabilitation therapy, and survivors' death benefits. Contractor shall require its Subcontractor(s), if any, to procure and maintain Workers' Compensation Insurance and Employers' Liability Insurance for all employees of Subcontractor(s). Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by Contractor's insurance. If any class of employee or employee engaged in Work under this Contract, on or at the Site of the Project, is not protected under the Workers' Compensation Insurance, Contractor shall provide, or shall cause a Subcontractor to provide, adequate insurance coverage for the protection of any employee(s) not otherwise protected before any of those employee(s) commence work.

13.1.5 Builder's Risk Insurance: Builder's Risk "All Risk" Insurance

Contractor shall procure and maintain, during the life of this Contract, Builder's Risk (Course of Construction), or similar first party property coverage acceptable to the District, issued on a replacement cost value basis. The cost shall be consistent with the total replacement cost of all insurable Work of the Project included within the Contract Documents. Coverage is to insure against all risks of accidental physical loss and shall include without limitation the perils of vandalism and/or malicious mischief (both without any limitation regarding vacancy or occupancy), sprinkler

leakage, civil authority, theft, sonic disturbance, earthquake, flood, collapse, wind, rain, dust, fire, war, terrorism, lightning, smoke, and rioting. Coverage shall include debris removal, demolition, increased costs due to enforcement of all applicable ordinances and/or laws in the repair and replacement of damaged and undamaged portions of the property, and reasonable costs for the Architect's and engineering services and expenses required as a result of any insured loss upon the Work and Project, including completed Work and Work in progress, to the full insurable value thereof.

13.1.6 Pollution Liability Insurance

13.1.6.1 Contractor shall procure and maintain Pollution Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, including natural resource damage, cleanup costs, removal, storage, disposal, and/or use of the pollutant arising from operations under this Contract, and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims. Coverage shall apply to sudden and/or gradual pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos. This coverage shall be provided in a form at least as broad as Insurance Services Offices, Inc. (ISO) Form CG 2415, or Contractor shall procure and maintain these coverages separately.

13.1.6.2 Contractor warrants that any retroactive date applicable to coverage under the policy shall predate the effective date of the Contract and that continuous coverage will be maintained or an extended reporting or discovery period will be exercised for a period of three (3) years, beginning from the time that the Work under the Contract is completed.

13.1.6.3 If Contractor is responsible for removing any pollutants from a site, then Contractor shall ensure that Any Auto, including owned, non-owned, and hired, is included within the above policies and at the required limits, to cover its automobile exposure from transporting the pollutants from the site to an approved disposal site. This coverage shall include the Motor Carrier Act Endorsement, MCS 90.

13.1.7 Proof of Insurance and Other Requirements: Endorsements and Certificates

13.1.7.1 Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract, until Contractor and its Subcontractor(s) have procured all required insurance and Contractor has delivered in duplicate to the District complete endorsements (or entire insurance policies) and certificates indicating the required coverages have been obtained, and the District has approved these documents.

13.1.7.2 Endorsements, certificates, and insurance policies shall include the following:

13.1.7.2.1 A clause stating the following, or other language acceptable to the District:

"This policy shall not be canceled until written notice to District, Architect, and Construction Manager stating date of the cancellation by the insurance carrier. Date of cancellation may not be less than thirty (30) days after date of mailing notice."

13.1.7.2.2 Language stating in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date, to whom cancellation and reduction notice will be sent, and length of notice period.

13.1.7.2.3 All endorsements, certificates and insurance policies shall state that District, its trustees, employees and agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s) and Architect(s) are named additional insureds under all policies except Workers' Compensation Insurance and Employers' Liability Insurance.

13.1.7.2.4 All endorsements shall waive any right to subrogation against any of the named additional insureds.

13.1.7.2.5 Contractor's and Subcontractors' insurance policy(s) shall be primary and non-contributory to any insurance or self-insurance maintained by District, its trustees, employees and/or agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s), and/or Architect(s).

13.1.7.2.6 Contractor's insurance limit shall apply separately to each insured against whom a claim is made or suit is brought.

13.1.7.3 No policy shall be amended, canceled or modified, and the coverage amounts shall not be reduced, until Contractor or Contractor's broker has provided written notice to District, Architect(s), and Construction Manager(s) stating date of the amendment, modification, cancellation or reduction, and a description of the change. Date of amendment, modification, cancellation or reduction may not be less than thirty (30) days after date of mailing notice.

13.1.7.1 Insurance written on a "claims made" basis shall be retroactive to a date that coincides with or precedes Contractor's commencement of Work, including subsequent policies purchased as renewals or replacements. Said policy is to be renewed by the Contractor and all Subcontractors for a period of five (5) years following completion of the Work or termination of this Agreement. Such insurance must have the same coverage and limits as the policy that was in effect during the term of this Agreement, and will cover the Contractor and all Subcontractors for all claims made.

13.1.7.2 Unless otherwise stated in the Special Conditions, all of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than **A: VII**.

13.1.7.3 The insurance requirements set forth herein shall in no way limit the Contractor's liability arising out of or relating to the performance of the Work or related activities.

13.1.7.4 Failure of Contractor and/or its Subcontractor(s) to comply with the insurance requirements herein shall be deemed a material breach of the Contract.

13.1.8 Insurance Policy Limits

13.1.8.1 Unless different limits are indicated in the Special Conditions, the limits of insurance shall not be less than the following amounts:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	\$2,000,000 per occurrence; \$4,000,000 aggregate
Automobile Liability – Any Auto	Combined Single Limit	\$1,000,000
Workers’ Compensation		Statutory limits pursuant to State law
Employers’ Liability		\$1,000,000
Builder’s Risk (Course of Construction)		Issued for the value and scope of Work indicated herein.
Pollution Liability		\$1,000,000 per claim; \$2,000,000 aggregate

13.1.8.2 If Contractor normally carries insurance in an amount greater than the minimum amounts required by District, that greater amount shall become the minimum required amount of insurance for purposes of the Contract. Therefore, Contractor hereby acknowledges and agrees that all insurance carried by it shall be deemed liability coverage for all actions it performs in connection with the Contract.

13.2 Contract Security - Bonds

13.2.1 Contractor shall furnish two surety bonds issued by a California admitted surety insurer as follows:

13.2.1.1 Performance Bond: A bond in an amount at least equal to one hundred percent (100%) of Contract Price as security for faithful performance of this Contract.

13.2.1.2 Payment Bond: A bond in an amount at least equal to one hundred percent (100%) of the Contract Price as security for payment of persons performing labor and/or furnishing materials in connection with this Contract.

13.2.2 Cost of bonds shall be included in the Bid and Contract Price.

13.2.3 All bonds related to this Project shall be in the forms set forth in these Contract Documents and shall comply with all requirements of the Contract Documents, including, without limitation, the bond forms.

14. WARRANTY/GUARANTEE/INDEMNITY

14.1 Warranty/Guarantee

14.1.1 The Contractor shall obtain and preserve for the benefit of the District, manufacturer's warranties on materials, fixtures, and equipment incorporated into the Work.

14.1.2 In addition to guarantees required elsewhere, Contractor shall, and hereby does guarantee and warrant all Work furnished on the job against all defects for a period of **ONE (1)** year after the later of the following dates, unless a longer period is provided for in the Contract Documents:

14.1.2.1 The acceptance by the District's governing board of the Work, subject to these General Conditions, or

14.1.2.2 The date that commissioning for the Project, if any, was completed.

At the District's sole option, Contractor shall repair or replace any and all of that Work, together with any other Work that may be displaced in so doing, that may prove defective in workmanship and/or materials within a **ONE (1)** year period from date of completion as defined above, unless a longer period is provided for in the Contract Documents, without expense whatsoever to District. In the event of failure of Contractor and/or Surety to commence and pursue with diligence said replacements or repairs within ten (10) days after being notified in writing, Contractor and Surety hereby acknowledge and agree that District is authorized to proceed to have defects repaired and made good at expense of Contractor and/or Surety who hereby agree to pay costs and charges therefore immediately on demand.

14.1.3 If, in the opinion of District, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to District or to prevent interruption of District operations, District will attempt to give the notice required above. If Contractor or Surety cannot be contacted or neither complies with District's request for correction within a reasonable time as determined by District, District may, notwithstanding the above provision, proceed to make any and all corrections and/or provide attentions the District believes are necessary. The costs of correction or attention shall be charged against Contractor and Surety of the guarantees provided in this Article or elsewhere in this Contract.

14.1.4 The above provisions do not in any way limit the guarantees on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish to District all appropriate guarantee or warranty certificates as indicated in the Specifications or upon request by District.

14.1.5 Nothing herein shall limit any other rights or remedies available to District.

14.2 Indemnity and Defense

14.2.1 To the furthest extent permitted by California law, the Contractor shall indemnify, keep and hold harmless the District, the Architect(s), and the Construction Manager(s), their respective consultants, separate contractors, board members, officers, representatives, agents, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, injury, damages, losses, and expenses ("Claims"), including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, in whole or in part, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers. However, the Contractor's indemnification and hold harmless obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability to the extent the Claim(s) is/are caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction. This indemnification and hold harmless obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist or arise as to Indemnitee or other person described herein. This indemnification and hold harmless obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the DIR.

14.2.2 To the furthest extent permitted by California law, Contractor shall also defend Indemnitees, at its own expense, including but not limited to attorneys' fees and costs, against all Claims caused by, arising out of, resulting from, or incidental to, in whole or in part, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers. However, without impacting Contractor's obligation to provide an immediate and ongoing defense of Indemnitees, the Contractor's defense obligation shall be retroactively reduced by the proportion of the Indemnitees' and/or Architect's liability to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction. The District shall have the right to accept or reject any legal representation that Contractor proposes to defend the Indemnitees. If any Indemnitee provides its own defense due to failure to timely respond to tender of defense, rejection of tender of defense, or conflict of interest of proposed counsel, Contractor shall reimburse such Indemnitee for any expenditures. Contractor's defense obligation shall not be construed to negate, abridge, or otherwise reduce any right or obligation of defense that would otherwise exist as to any Indemnitee or other person described herein. Contractor's defense obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the DIR. The Contractor shall give prompt notice to the District in the event of any Claim(s).

14.2.3 Without limitation of the provisions herein, if the Contractor's obligation to indemnify and hold harmless the Indemnitees or its obligation to defend Indemnitees as provided herein shall be determined to be void or unenforceable, in whole or in part, it is the intention of the parties that these circumstances shall not otherwise affect the validity or enforceability of the Contractor's agreement to indemnify, defend, and hold harmless the rest of the Indemnitees, as provided herein. Further, the Contractor shall be and remain fully liable on its agreements and obligations herein to the fullest extent permitted by law.

14.2.4 Pursuant to Public Contract Code section 9201, the District shall provide timely notification to Contractor of the receipt of any third-party claim relating to this Contract. The District shall be entitled to recover its reasonable costs incurred in providing said notification.

14.2.5 In any and all claims against any of the Indemnitees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the Contractor's indemnification obligation herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

14.2.6 The District may retain so much of the moneys due the Contractor as shall be considered necessary, until disposition of any such Claims or until the District, Architect(s) and Construction Manager(s) have received written agreement from the Contractor that they will unconditionally defend the District, Architect(s) and Construction Manager(s), their respective officers, agents and employees, and pay any damages due by reason of settlement or judgment.

14.2.7 The Contractor's defense and indemnification obligations hereunder shall survive the completion of Work, the warranty/guarantee period, and the termination of the Contract.

15. TIME

15.1 Notice to Proceed

15.1.1 District may issue a Notice to Proceed within ninety (90) days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

15.1.2 In the event that the District desires to postpone issuing the Notice to Proceed beyond ninety (90) days from the date of the Notice of Award, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed.

15.1.3 If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to Contractor, Contractor may terminate the Contract. Contractor's termination due to a postponement shall be by written notice to District within ten (10) days after receipt by Contractor of District's notice of postponement.

It is further understood by Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement. Should Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.

15.2 Computation of Time / Adverse Weather

15.2.1 The Contractor will only be allowed a time extension for Adverse Weather conditions if requested by Contractor in compliance with the time extension request procedures and only if all of the following conditions are met:

15.2.1.1 The weather conditions constitute Adverse Weather, as defined herein and further specified in the Special Conditions;

15.2.1.2 Contractor can verify that the Adverse Weather caused delays in excess of five (5) hours of the indicated labor required to complete the scheduled tasks of Work on the day affected by the Adverse Weather;

15.2.1.3 The Contractor's crew is dismissed as a result of the Adverse Weather;

15.2.1.4 Said delay adversely affects the critical path in the Construction Schedule; and

15.2.1.5 Exceeds twelve (12) days of delay per year.

15.2.2 If the aforementioned conditions are met, a non-compensable day-for-day extension will only be allowed for those days in excess of those indicated in the Special Conditions.

15.2.3 The Contractor shall work seven (7) days per week, if necessary, irrespective of inclement weather, to maintain access and the Construction Schedule, and to protect the Work under construction from the effects of Adverse Weather, all at no further cost to the District.

15.2.4 The Contract Time has been determined with consideration given to the average climate weather conditions prevailing in the County in which the Project is located.

15.3 Hours of Work

15.3.1 Sufficient Forces

Contractor and Subcontractors shall continuously furnish sufficient and competent work forces with the required levels of familiarity with the Project and skill, training and experience to ensure the prosecution of the Work in accordance with the Construction Schedule.

15.3.2 Performance During Working Hours

Work shall be performed during regular working hours as permitted by the appropriate governmental agency except that in the event of an emergency, or when

required to complete the Work in accordance with job progress, Work may be performed outside of regular working hours with the advance written consent of the District and approval of any required governmental agencies.

15.3.3 No Work during Testing

Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking tests. The District or District's Representative will provide Contractor with a schedule of test dates concurrent with the District's issuance of the Notice to Proceed, or as soon as test dates are made available to the District.

15.4 Progress and Completion

15.4.1 Time of the Essence

Time limits stated in the Contract Documents are of the essence to the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

15.4.2 No Commencement Without Insurance or Bonds

The Contractor shall not commence operations on the Project or elsewhere prior to the effective date of insurance and bonds. The date of commencement of the Work shall not be changed by the effective date of such insurance or bonds. If Contractor commences Work without insurance and bonds, all Work is performed at Contractor's peril and shall not be compensable until and unless Contractor secures bonds and insurance pursuant to the terms of the Contract Documents and subject to District claim for damages.

15.5 Schedule

Contractor shall provide to District, Construction Manager, and Architect a schedule in conformance with the Contract Documents and as required in the Notice to Proceed and the Contractor's Submittals and Schedules section of these General Conditions.

15.6 Expeditious Completion

The Contractor shall proceed expeditiously with adequate forces and shall achieve Completion within the Contract Time.

16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES

16.1 Liquidated Damages

Contractor and District hereby agree that the exact amount of damages for failure to complete the Work within the time specified is extremely difficult or impossible to determine. If the Work is not completed within the time specified in the Contract Documents, it is understood that the District will suffer damage. It being impractical and unfeasible to determine the amount of actual damage, it is agreed the Contractor shall pay to District as fixed and liquidated damages, and not as a penalty, the amount set forth in the Agreement for each calendar day of delay in completion. Contractor and

its Surety shall be liable for the amount thereof pursuant to Government Code section 53069.85.

16.2 Excusable Delay

16.2.1 Contractor shall not be charged for liquidated damages because of any delays in completion of Work which are not the fault of Contractor or its Subcontractors, including acts of God as defined in Public Contract Code section 7105, acts of enemy, epidemics, and quarantine restrictions. Contractor shall, within five (5) calendar days of beginning of any delay, notify District in writing of causes of delay including documentation and facts explaining the delay and the direct correlation between the cause and effect. District shall review the facts and extent of any delay and shall grant extension(s) of time for completing Work when, in its judgment, the findings of fact justify an extension. Extension(s) of time shall apply only to that portion of Work affected by delay, and shall not apply to other portions of Work not so affected. An extension of time may only be granted if Contractor has timely submitted the Construction Schedule as required herein.

16.2.2 Contractor shall notify the District pursuant to the claims provisions in these General Conditions of any anticipated delay and its cause. Following submission of a claim, the District may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work might be delayed thereby.

16.2.3 In the event the Contractor requests an extension of Contract Time for unavoidable delay, such request shall be submitted in accordance with the provisions in the Contract Documents governing changes in Work. When requesting time, requests must be submitted with full justification and documentation. If the Contractor fails to submit justification, it waives its right to a time extension at a later date. Such justification must be based on the official Construction Schedule as updated at the time of occurrence of the delay or execution of Work related to any changes to the Scope of Work. Any claim for delay must include the following information as support, without limitation:

16.2.3.1 The duration of the activity relating to the changes in the Work and the resources (manpower, equipment, material, etc.) required to perform the activities within the stated duration.

16.2.3.1 Specific logical ties to the Contract Schedule for the proposed changes and/or delay showing the activity/activities in the Construction Schedule that are affected by the change and/or delay. In particular, Contractor must show an actual impact to the schedule, after making a good faith effort to mitigate the delay by rescheduling the work, by providing an analysis of the schedule ("Time Impact Analysis"). Such Time Impact Analysis shall describe in detail the cause and effect of the delay and the impact on the critical dates in the Project schedule. (A portion of any delay of seven (7) days or more must be provided.)

16.2.3.2 A recovery schedule must be submitted within twenty (20) calendar days of written notification to the District of causes of delay.

16.3 No Additional Compensation for Delays Within Contractor's Control

16.3.1 Contractor is aware that governmental agencies, including, without limitation, the Division of the State Architect, the Department of General Services, gas companies, electrical utility companies, water districts, and other agencies may have to approve Contractor-prepared drawings or approve a proposed installation. Accordingly, Contractor shall include in its bid, time for possible review of its drawings and for reasonable delays and damages that may be caused by such agencies. Thus, Contractor is not entitled to make a claim for damages or delays arising from the review of Contractor's drawings.

16.3.2 Contractor shall only be entitled to compensation for delay when all of the following conditions are met:

16.3.2.1 The District is responsible for the delay;

16.3.2.2 The delay is unreasonable under the circumstances involved;

16.3.2.3 The delay was not within the contemplation of the District and Contractor;

16.3.2.4 The delay could not have been avoided or mitigated by Contractor's reasonable diligence; and

16.3.2.5 Contractor timely complies with the claims procedure of the Contract Documents.

16.4 Float or Slack in the Schedule

Float or slack is the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule. Float or slack is not for the exclusive use of or benefit of either the District or the Contractor, but its use shall be determined solely by the District.

17. CHANGES IN THE WORK

17.1 No Changes Without Authorization

17.1.1 There shall be no change whatsoever in the Drawings, Specifications, or in the Work without an executed Change Order or a written Construction Change Directive authorized by the District as herein provided. District shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the District's governing board has authorized the same and the cost thereof has been approved in writing by Change Order or Construction Change Directive in advance of the changed Work being performed. No extension of time for performance of the Work shall be allowed hereunder unless claim for such extension is made at the time changes in the Work are ordered, and such time duly adjusted and approved in writing in the Change Order or Construction Change Directive. Contractor shall be responsible for any costs incurred by the District for professional services and DSA fees and/or delay to the Project Schedule, if any, for DSA to review any request for changes to the DSA approved plans and specifications for the convenience of the Contractor and/or to accommodate the Contractor's means and methods. The provisions of the Contract

Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications.

17.1.2 Contractor shall perform immediately all work that has been authorized by a fully executed Change Order or Construction Change Directive. Contractor shall be fully responsible for any and all delays and/or expenses caused by Contractor's failure to expeditiously perform this Work.

17.1.3 Should any Change Order result in an increase in the Contract Price or extend the Contract Time, the cost of or length of extension in that Change Order shall be agreed to, in writing, by the District in advance of the Work by Contractor, and shall be subject to the monetary limitations set forth in Public Contract Code section 20118.4. In the event that Contractor proceeds with any change in Work without a Change Order executed by the District or Construction Change Directive, Contractor waives any claim of additional compensation or time for that additional work. Under no circumstances shall Contractor be entitled to any claim of additional compensation or time not expressly requested by Contractor in a Proposed Change Order or approved by District in an executed Change Order.

17.1.4 A Change Order or Construction Change Directive will become effective when approved by the Board, notwithstanding that Contractor has not signed it. A Change Order or Construction Change Directive will become effective without Contractor's signature provided District indicates it as a "Unilateral Change Order". Any dispute as to the adjustment in the Contract Price or Contract Time, if any, of the Unilateral Change Order shall be resolved pursuant to the Payment and Claims and Disputes provisions herein.

17.1.5 Contractor understands, acknowledges, and agrees that the reason for District authorization is so that District may have an opportunity to analyze the Work and decide whether the District shall proceed with the Change Order or alter the Project so that a change in Work becomes unnecessary.

17.2 Architect Authority

The Architect will have authority to order minor changes in the Work not involving any adjustment in the Contract Price, or an extension of the Contract Time, or a change that is inconsistent with the intent of the Contract Documents. These changes shall be effected by written Change Order, Construction Change Directive, by Architect's response(s) to RFI(s), or by Architect's Supplemental Instructions ("ASI").

17.3 Change Orders

17.3.1 A Change Order is a written instrument prepared and issued by the District and/or the Architect and signed by the District (as authorized by the District's Governing Board), the Contractor, the Architect, and approved by the Project Inspector (if necessary) and DSA (if necessary), stating their agreement regarding all of the following:

17.3.1.1 A description of a change in the Work;

17.3.1.2 The amount of the adjustment in the Contract Price, if any; and

17.3.1.3 The extent of the adjustment in the Contract Time, if any.

17.4 Construction Change Directives

17.4.1 A Construction Change Directive is a written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work. The District may, as provided by law, by Construction Change Directive and without invalidating the Contract, order changes in the Work consisting of additions, deletions, or other revisions. The adjustment to the Contract Price or Time, if any, is subject to the provisions of this section regarding Changes in the Work. If all or a portion of the Project is being funded by funds requiring approval by the State Allocation Board ("SAB"), these revisions may be subject to compensation once approval of same is received and funded by the SAB, and funds are released by the Office of Public School Construction ("OPSC"). Any dispute as to the adjustment in the Contract Price, if any, of the Construction Change Directive or timing of payment shall be resolved pursuant to the Payment and Claims and Disputes provisions herein.

17.4.2 The District may issue a Construction Change Directive in the absence of agreement on the terms of a Change Order.

17.5 Force Account Directives

17.5.1 When work, for which a definite price has not been agreed upon in advance, is to be paid for on a force account basis, all direct costs necessarily incurred and paid by the Contractor for labor, material, and equipment used in the performance of that Work, shall be subject to the approval of the District and compensation will be determined as set forth herein.

17.5.2 The District will issue a Force Account Directive to proceed with the Work on a force account basis, and a not-to-exceed budget will be established by the District.

17.5.3 All requirements regarding direct cost for labor, labor burden, material, equipment, and markups on direct costs for overhead and profit described in this section shall apply to Force Account Directives. However, the District will only pay for actual costs verified in the field by the District or its authorized representative(s) on a daily basis.

17.5.4 The Contractor shall be responsible for all cost related to the administration of Force Account Directive. The markup for overhead and profit for Contractor modifications shall be full compensation to the Contractor to administer Force Account Directive, and Contractor shall not be entitled to separately recover additional amounts for overhead and/or profit.

17.5.5 The Contractor shall notify the District or its authorized representative(s) at least twenty-four (24) hours prior to proceeding with any of the force account work. Furthermore, the Contractor shall notify the District when it has consumed eighty percent (80%) of the budget, and shall not exceed the budget unless specifically authorized in writing by the District. The Contractor will not be compensated for force account work in the event that the Contractor fails to timely notify the District regarding the commencement of force account work, or exceeding the force account budget.

17.5.6 The Contractor shall diligently proceed with the work, and on a daily basis, submit a daily force account report on a form supplied by the District no later than 5:00 p.m. each day. The report shall contain a detailed itemization of the daily labor, material, and equipment used on the force account work only. The names of the individuals performing the force account work shall be included on the daily force account reports. The type and model of equipment shall be identified and listed. The District will review the information contained in the reports, and sign the reports no later than the next work day, and return a copy of the report to the Contractor for their records. The District will not sign, nor will the Contractor receive compensation for work the District cannot verify. The Contractor will provide a weekly force account summary indicating the status of each Force Account Directive in terms of percent complete of the not-to-exceed budget and the estimated percent complete of the work.

17.5.7 In the event the Contractor and the District reach a written agreement on a set cost for the work while the work is proceeding based on a Force Account Directive, the Contractor's signed daily force account reports shall be discontinued and all previously signed reports shall be invalid.

17.6 Price Request

17.6.1 Definition of Price Request

A Price Request ("PR") is a written request prepared by the Architect requesting the Contractor to submit to the District and the Architect an estimate of the effect of a proposed change in the Work on the Contract Price and the Contract Time.

17.6.2 Scope of Price Request

A Price Request shall contain adequate information, including any necessary Drawings and Specifications, to enable Contractor to provide the cost breakdowns required herein. The Contractor shall not be entitled to any additional compensation for preparing a response to a Price Request, whether ultimately accepted or not.

17.7 Proposed Change Order

17.7.1 Definition of Proposed Change Order

A Proposed Change Order ("PCO") is a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

17.7.2 Changes in Contract Price

A PCO shall include breakdowns and backup documentation pursuant to the revisions herein and sufficient, in the District's judgment, to validate any change in Contract Price. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional compensation for Change Order Work.

17.7.3 Changes in Time

A PCO shall also include any changes in time required to complete the Project. Any additional time requested shall not be the number of days to make the proposed

change, but must be based upon the impact to the Construction Schedule as defined in the Contract Documents. The Contractor shall justify the proposed change in time by submittal of a schedule analysis that accurately shows the impact of the change on the critical path of the Construction Schedule ("Time Impact Analysis"). If Contractor fails to request a time extension in a PCO, including the Time Impact Analysis then the Contractor is thereafter precluded from requesting, and waives any right to request, additional time and/or claim a delay. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional time for Change Order Work. A PCO that leaves the amount of time requested blank, or states that such time requested is "to be determined", is not permitted and shall also constitute a waiver of any right to request additional time and/or claim a delay.

17.7.4 Unknown and/or Unforeseen Conditions

If there is an Allowance, then Contractor must submit a Request for Allowance Expenditure Directive, including supporting documentation as described below, to receive authorization for the release of funds from the Allowance. Allowance Expenditure Directives shall be based on Contractor's costs, without overhead and profit, for products, delivery, installation, labor, insurance, payroll, taxes, bonding and equipment rental will be included in Allowance Expenditure Directive authorizing expenditure of funds from this Allowance. No overhead and profit shall be added to the Allowance Expenditure Directive. If cost of the unforeseen condition(s) exceed the Allowance, Contractor must submit a PCO for amounts in excess of the Allowance requesting an increase in Contract Price and/or Contract Time that is based at least partially on Contractor's assertion that Contractor has encountered unknown and/or unforeseen condition(s) on the Project, then Contractor shall base the PCO on provable information that, beyond a reasonable doubt and to the District's satisfaction, demonstrates that the unknown and/or unforeseen condition(s) were actually unknown and/or unforeseen and that the condition(s) were reasonably unknown and/or unforeseen. If not, the District shall deny the PCO as unsubstantiated, and the Contractor shall complete the Project without any increase in Contract Price and/or Contract Time based on that PCO.

17.7.5 Time to Submit Proposed Change Order

Contractor shall submit its PCO within five (5) working days of the date Contractor discovers, or reasonably should have discovered, the circumstances giving rise to the PCO, unless additional time to submit a PCO is granted in writing by the District. Time is of the essence in Contractor's submission of PCOs so that the District can promptly investigate the basis for the PCO. Accordingly, if Contractor fails to submit its PCO within this timeframe, Contractor waives, releases, and discharges any right to assert or claim any entitlement to an adjustment of the Contract Price and/or Time based on circumstances giving rise to the PCO

17.7.6 Proposed Change Order Certification

In submitting a PCO, Contractor certifies and affirms that the cost and/or time request is submitted in good faith, that the cost and/or time request is accurate and in accordance with the provisions of the Contract Documents, and the Contractor submits the cost and/or request for extension of time recognizing the significant civil penalties and treble damages which follow from making a false claim or presenting a false claim under Government Code section 12650 et seq.

It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project including, without limitation, cumulative impacts. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

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17.8 Format for Proposed Change Order

17.8.1 The following format shall be used as applicable by the District and the Contractor (e.g. Change Orders, PCO’s) to communicate proposed additions and deductions to the Contract, supported by attached documentation. Any spaces left blank will be deemed no change to cost or time.

	<u>WORK PERFORMED OTHER THAN BY CONTRACTOR</u>	<u>ADD</u>	<u>DEDUCT</u>
(a)	<u>Material</u> (attach suppliers’ invoice or itemized quantity and unit cost plus sales tax)		
(b)	<u>Add Labor</u> (attach itemized hours and rates, fully encumbered)		
(c)	<u>Add Equipment</u> (attach suppliers’ invoice)		
(d)	<u>Subtotal</u>		
(e)	<u>Add overhead and profit for any and all tiers of Subcontractor</u> , the total not to exceed ten percent (10%) of Item (d)		
(f)	<u>Subtotal</u>		
(g)	<u>Add Overhead and Profit for Contractor</u> , not to exceed five percent (5%) of Item (f)		
(h)	<u>Subtotal</u>		
(i)	<u>Add Bond and Insurance</u> , not to exceed one and a half percent (1.5%) of Item (h)		
(j)	<u>TOTAL</u>		
(k)	<u>Time</u> (zero unless indicated; “TBD” not permitted)	____ Calendar Days	

	<u>WORK PERFORMED BY CONTRACTOR</u>	<u>ADD</u>	<u>DEDUCT</u>
(a)	<u>Material</u> (attach itemized quantity and unit cost plus sales tax)		
(b)	<u>Add Labor</u> (attach itemized hours and rates, fully encumbered)		
(c)	<u>Add Equipment</u> (attach suppliers’ invoice)		
(d)	<u>Subtotal</u>		
(e)	<u>Add Overhead and Profit for Contractor</u> , not to exceed fifteen percent (15%) of Item (d)		
(f)	<u>Subtotal</u>		
(g)	<u>Add Bond and Insurance</u> , not to exceed one and a half percent (1.5%) of Item (f)		
(h)	<u>TOTAL</u>		
(i)	<u>Time</u> (zero unless indicated; “TBD” not permitted)	____ Calendar Days	

17.8.2 Labor. Contractor shall be compensated for the costs of labor actually and directly utilized in the performance of the Work. Such labor costs shall be the actual cost, not to exceed prevailing wage rates in the locality of the Site and shall be in the labor classification(s) necessary for the performance of the Work, plus employer payments of payroll taxes and insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State,

or local laws. Labor costs shall exclude costs incurred by the Contractor in preparing estimate(s) of the costs of the change in the Work, in the maintenance of records relating to the costs of the change in the Work, coordination and assembly of materials and information relating to the change in the Work or performance thereof, or the supervision and other overhead and general conditions costs associated with the change in the Work or performance thereof, including but not limited to the cost for the job superintendent.

17.8.3 Materials. Contractor shall be compensated for the costs of materials necessarily and actually used or consumed in connection with the performance of the change in the Work. Costs of materials may include reasonable costs of transportation from a source closest to the Site of the Work and delivery to the Site. If discounts by material suppliers are available for materials necessarily used in the performance of the change in the Work, they shall be credited to the District. If materials necessarily used in the performance of the change in the Work are obtained from a supplier or source owned in whole or in part by the Contractor, compensation therefor shall not exceed the current wholesale price for such materials. If, in the reasonable opinion of the District, the costs asserted by the Contractor for materials in connection with any change in the Work are excessive, or if the Contractor fails to provide satisfactory evidence of the actual costs of such materials from its supplier or vendor of the same, the costs of such materials and the District's obligation to pay for the same shall be limited to the then lowest wholesale price at which similar materials are available in the quantities required to perform the change in the Work. The District may elect to furnish materials for the change in the Work, in which event the Contractor shall not be compensated for the costs of furnishing such materials or any mark-up thereon.

17.8.4 Equipment. As a precondition for the District's duty to pay for Equipment rental or loading and transportation, Contractor shall provide satisfactory evidence of the actual costs of Equipment from the supplier, vendor or rental agency of same. Contractor shall be compensated for the actual cost of the necessary and direct use of Equipment in the performance of the change in the Work. Use of such Equipment in the performance of the change in the Work shall be compensated in increments of fifteen (15) minutes. Rental time for Equipment moved by its own power shall include time required to move such Equipment to the site of the Work from the nearest available rental source of the same. If Equipment is not moved to the Site by its own power, Contractor will be compensated for the loading and transportation costs in lieu of rental time. The foregoing notwithstanding, neither moving time or loading and transportation time shall be allowed if the Equipment is used for performance of any portion of the Work other than the change in the Work. Unless prior approval in writing is obtained by the Contractor from the Architect, the Project Inspector and the District, no costs or compensation shall be allowed for time while Construction Equipment is inoperative, idle or on standby, for any reason. Contractor shall not be entitled to an allowance or any other compensation for Equipment or tools used in the performance of change in the Work where such Equipment or tools have a replacement value of \$500.00 or less. Equipment costs claimed by the Contractor in connection with the performance of any Work shall not exceed rental rates established by distributors or construction equipment rental agencies in the locality of the Site; any costs asserted which exceed such rental rates shall not be allowed or paid. Unless otherwise specifically approved in writing by the Architect, the Project Inspector and the District, the allowable rate for the use of Equipment in connection with the Work shall constitute full compensation to the Contractor for the cost of rental, fuel, power, oil, lubrication, supplies, necessary

attachments, repairs or maintenance of any kind, depreciation, storage, insurance, labor (exclusive of labor costs of the Equipment operator), and any and all other costs incurred by the Contractor incidental to the use of such Equipment.

17.8.5 Overhead and Profit. The phrase "Overhead and Profit" shall include field and office supervisors and assistants, watchperson, use of small tools, consumable, insurance other than construction bonds and insurance required herein, general conditions costs and home office expenses.

17.9 Change Order Certification

17.9.1 All Change Orders and PCOs include the following certification by the Contractor, either in the form specifically or incorporated by this reference:

17.9.1.1 The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

17.9.1.2 It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project including, without limitation, cumulative impacts. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

17.9.2 Accord and Satisfaction: Contractor's execution of any Change Order shall constitute a full accord and satisfaction, and release, of all Contractor (and if applicable, Subcontractor) claims for additional time, money or other relief arising from or relating to the subject matter of the change including, without limitation, impacts of all types, cumulative impacts, inefficiency, overtime, delay and any other type of claim.

17.10 Determination of Change Order Cost

17.10.1 The amount of the increase or decrease in the Contract Price from a Change Order, if any, shall be determined in one or more of the following ways as applicable to a specific situation and at the District's discretion:

17.10.1.1 District acceptance of a PCO;

17.10.1.2 By unit prices contained in Contractor's original bid;

17.10.1.3 By agreement between District and Contractor.

17.11 Deductive Change Orders

All deductive Change Order(s) must be prepared pursuant to the provisions herein. Where a portion of the Work is deleted from the Contract, the reasonable value of the deducted work less the value of work performed shall be considered the appropriate deduction. The value submitted on the Schedule of Values shall be used to calculate the credit amount unless the bid documentation is being held in escrow as part of the Contract Documents. Unit Prices, if any, may be used in District's discretion in calculating reasonable value. If Contractor offers a proposed amount for a deductive Change Order(s), Contractor shall include a minimum of five percent (5%) total profit and overhead to be deducted with the amount of the work of the Change Order(s). If Subcontractor work is involved, Subcontractors shall also include a minimum of five percent (5%) profit and overhead to be deducted with the amount of its deducted work. Any deviation from this provision shall not be allowed.

17.12 Addition or Deletion of Alternate Bid Item(s)

If the Bid Form and Proposal includes proposal(s) for Alternate Bid Item(s), during Contractor's performance of the Work, the District may elect to add or delete any such Alternate Bid Item(s) if not included in the Contract at the time of award. If the District elects to add or delete Alternate Bid Item(s) after Contract award, the cost or credit for such Alternate Bid Item(s) shall be as set forth in the Bid Form and Proposal unless the parties agree to a different price and the Contract Time shall be adjusted by the number of days allocated in the Contract Documents. If days are not allocated in the Contract Documents, the Contract Time shall be equitably adjusted.

17.13 Discounts, Rebates, and Refunds

For purposes of determining the cost, if any, of any change, addition, or omission to the Work hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so that such discounts, rebates, refunds, and returns may be secured, and the amount thereof shall be allowed as a reduction of the Contractor's cost in determining the actual cost of construction for purposes of any change, addition, or omission in the Work as provided herein.

17.14 Accounting Records

With respect to portions of the Work performed by Change Orders and Construction Change Directives, the Contractor shall keep and maintain cost-accounting records satisfactory to the District, including, without limitation, Job Cost Reports as provided in these General Conditions, which shall be available to the District on the same terms as any other books and records the Contractor is required to maintain under the Contract Documents. Such records shall include without limitation hourly records for Labor and Equipment and itemized records of materials and Equipment used that day in connection with the performance of any Work. All records maintained hereunder shall be subject to inspection, review and/or reproduction by the District, the Architect or the Project Inspector upon request. In the event that the Contractor fails or refuses, for any reason, to maintain or make available for inspection, review and/or reproduction such records, the District's reasonable good faith determination of the extent of adjustment to the Contract Price shall be final, conclusive, dispositive and binding upon Contractor.

17.15 Notice Required

If the Contractor desires to make a claim for an increase in the Contract Price, or any extension in the Contract Time for completion, it shall notify the District pursuant to the provisions herein, including the Article on Claims and Disputes. No claim shall be considered unless made in accordance with this subparagraph. Contractor shall proceed to execute the Work even though the adjustment may not have been agreed upon. Any change in the Contract Price or extension of the Contract Time resulting from such claim shall be authorized by a Change Order.

17.16 Applicability to Subcontractors

Any requirements under this Article shall be equally applicable to Change Orders or Construction Change Directives issued to Subcontractors by the Contractor to the extent as required by the Contract Documents.

17.17 Alteration to Change Order Language

Contractor shall not alter Change Orders or reserve time in Change Orders. Change Orders altered in violation of this provision, if in conflict with the terms set forth herein, shall be construed in accordance with the terms set forth herein. Contractor shall execute finalized Change Orders and proceed under the provisions herein with proper notice.

17.18 Failure of Contractor to Execute Change Order

Contractor shall be in default of the Contract if Contractor fails to execute a Change Order when the Contractor agrees with the addition and/or deletion of the Work in that Change Order.

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18. REQUEST FOR INFORMATION

18.1 Any Request for Information shall reference all applicable Contract Document(s), including Specification section(s), detail(s), page number(s), drawing number(s), and sheet number(s), etc. The Contractor shall make suggestions and interpretations of the issue raised by each Request for Information. A Request for Information cannot modify the Contract Price, Contract Time, or the Contract Documents. Upon request by the District, Contractor shall provide an electronic copy of the Request for Information in addition to the hard copy.

18.2 The Contractor shall be responsible for any costs incurred for professional services that District may deduct from any amounts owing to the Contractor, if a Request for Information requests an interpretation or decision of a matter where the information sought is equally available to the party making the request. District, at its sole discretion, shall deduct from and/or invoice Contractor for all the professional services arising herein.

19. PAYMENTS

19.1 Contract Price

The Contract Price is stated in the Agreement and, including authorized adjustments, is the total amount payable by the District to the Contractor for performance of the Work under the Contract Documents.

19.2 Applications for Progress Payments

19.2.1 Procedure for Applications for Progress Payments

19.2.1.1 Application for Progress Payment

19.2.1.1.1 Not before the fifth (5th) day of each calendar month during the progress of the Work, Contractor shall submit to the District and the Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be notarized, if required, and supported by the following or each portion thereof unless waived by the District in writing:

19.2.1.1.1.1 The amount paid to the date of the Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;

19.2.1.1.1.2 The amount being requested under the Application for Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;

19.2.1.1.1.3 The balance that will be due to each of such entities after said payment is made;

19.2.1.1.1.4 A certification that the As-Builts and annotated Specifications are current;

19.2.1.1.1.5 Itemized breakdown of work done for the purpose of requesting partial payment;

19.2.1.1.1.6 An updated and acceptable construction schedule in conformance with the provisions herein;

19.2.1.1.1.7 The additions to and subtractions from the Contract Price and Contract Time;

19.2.1.1.1.8 A total of the retentions held;

19.2.1.1.1.9 Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the District may require from time to time;

19.2.1.1.1.10 The percentage of completion of the Contractor's Work by line item;

19.2.1.1.1.11 Schedule of Values updated from the preceding Application for Payment;

19.2.1.1.1.12 A duly completed and executed conditional waiver and release upon progress payment compliant with Civil Code section 8132 from the Contractor and each subcontractor of any tier and supplier to be paid from the current progress payment;

19.2.1.1.1.13 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134 from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payment(s); and

19.2.1.1.1.14 A certification by the Contractor of the following:

The Contractor warrants title to all Work performed as of the date of this payment application has been completed in accordance with the Contract Documents for the Project. The Contractor further warrants that all amounts have been paid for work which previous Certificates for Payment were issued and payments received and all Work performed as of the date of this payment application is free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, workers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work, except those of which the District has been informed. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq.

19.2.1.1.1.15 The Contractor shall be subject to the False Claims Act set forth in Government Code section 12650 et seq. for information provided with any Application for Progress Payment.

19.2.1.1.1.16 All remaining certified payroll records ("CPR(s)") for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work for the period of the Application for Payment. As indicated herein, the District shall not make any payment to Contractor until:

19.2.1.1.1.16.1 Contractor and/or its Subcontractor(s) provide electronic CPRs weekly for all weeks any journeyman, apprentice, worker or other employee was employed in connection with the Work directly to the DIR, or within ten (10) days of any request by the District or the DIR, and

19.2.1.1.1.16.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs in a timely manner may directly delay the Contractor's payment.

19.2.1.1.2 Applications received after June 20th will not be paid until the second week of July and applications received after December 12th will not be paid until the first week of January.

19.2.2 Prerequisites for Progress Payments

19.2.2.1 First Payment Request: The following items, if applicable, must be completed before the District will accept and/or process the Contractor's first payment request:

19.2.2.1.1 Installation of the Project sign;

19.2.2.1.2 Installation of field office;

19.2.2.1.3 Installation of temporary facilities and fencing;

19.2.2.1.4 Schedule of Values;

19.2.2.1.5 Contractor's Construction Schedule;

19.2.2.1.6 Schedule of unit prices, if applicable;

19.2.2.1.7 Submittal Schedule;

19.2.2.1.8 Receipt by Architect of all submittals due as of the date of the payment application;

19.2.2.1.9 Copies of necessary permits;

19.2.2.1.10 Copies of authorizations and licenses from governing authorities;

19.2.2.1.11 Initial progress report;

19.2.2.1.12 Surveyor qualifications;

19.2.2.1.13 Written acceptance of District's survey of rough grading, if applicable;

19.2.2.1.14 List of all Subcontractors, with names, license numbers, telephone numbers, and Scope of Work;

19.2.2.1.15 All bonds and insurance endorsements; and

19.2.2.1.16 Resumes of Contractor's project manager, and if applicable, job site secretary, record documents recorder, and job site superintendent.

19.2.2.2 Second Payment Request: The District will not process the second payment request until and unless all submittals and Shop Drawings have been accepted for review by the Architect.

19.2.2.3 No Waiver of Criteria: Any payments made to Contractor where criteria set forth herein have not been met shall not constitute a waiver of said criteria by District. Instead, such payment shall be construed as a good faith effort by District to resolve differences so Contractor may pay its Subcontractors and suppliers. Contractor agrees that failure to submit such items may constitute a breach of contract by Contractor and may subject Contractor to termination.

19.3 Progress Payments

19.3.1 District's Approval of Application for Payment

19.3.1.1 Upon receipt of an Application for Payment, The District shall act in accordance with both of the following:

19.3.1.1.1 Each Application for Payment shall be reviewed by the District as soon as practicable after receipt for the purpose of determining that the Application for Payment is a proper Application for Payment.

19.3.1.1.2 Any Application for Payment determined not to be a proper Application for Payment suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days, after receipt. An Application for Payment returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the Application for Payment is not proper. The number of days available to the District to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the District exceeds this seven-day return requirement.

19.3.1.1.3 An Application for Payment shall be considered properly executed if funds are available for payment of the Application for Payment, and payment is not delayed due to an audit inquiry by the financial officer of the District.

19.3.1.2 The District's review of the Contractor's Application for Payment will be based on the District's and the Architect's observations at the Site and the data comprising the Application for Payment that the Work has progressed to the point indicated and that, to the best of the District's and the Architect's knowledge,

information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to:

19.3.1.2.1 Observation of the Work for general conformance with the Contract Documents,

19.3.1.2.2 Results of subsequent tests and inspections,

19.3.1.2.3 Minor deviations from the Contract Documents correctable prior to completion, and

19.3.1.2.4 Specific qualifications expressed by the Architect.

19.3.1.3 District's approval of the certified Application for Payment shall be based on Contractor complying with all requirements for a fully complete and valid certified Application for Payment.

19.3.2 Payments to Contractor

19.3.2.1 Within thirty (30) days after approval of the Application for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the value of the Work performed (as verified by Architect and Inspector and certified by Contractor) up to the last day of the previous month, less the aggregate of previous payments and amount to be withheld. The value of the Work completed shall be Contractor's best estimate. No inaccuracy or error in said estimate shall operate to release the Contractor, or any Surety upon any bond, from damages arising from such Work, or from the District's right to enforce each and every provision of this Contract, and the District shall have the right subsequently to correct any error made in any estimate for payment.

19.3.2.2 The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for Work performed, so long as any lawful or proper direction given by the District concerning the Work, or any portion thereof, remains incomplete.

19.3.2.3 If the District fails to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted Application for Payment from the Contractor, the District shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure.

19.3.3 No Waiver

No payment by District hereunder shall be interpreted so as to imply that District has inspected, approved, or accepted any part of the Work. Notwithstanding any payment, the District may enforce each and every provision of this Contract. The District may correct or require correction of any error subsequent to any payment.

19.4 Decisions to Withhold Payment

19.4.1 Reasons to Withhold Payment

The District may withhold payment in whole, or in part, to the extent reasonably necessary to protect the District if, in the District's opinion, the representations to the District required herein cannot be made. The District may withhold payment, in whole, or in part, to such extent as may be necessary to protect the District from loss because of, but not limited to any of the following:

19.4.1.1 Defective Work not remedied within **FORTY-EIGHT (48)** hours of written notice to Contractor.

19.4.1.2 Stop Payment Notices or other liens served upon the District as a result of the Contract. Contractor agrees that the District may withhold up to 125% of the amount claimed in the Stop Payment Notice to answer the claim and to provide for the District's reasonable cost of any litigation pursuant to the stop payment notice.

19.4.1.3 Liquidated damages assessed against the Contractor.

19.4.1.4 The cost of completion of the Contract if there exists a reasonable doubt that the Work can be completed for the unpaid balance of the Contract Price or by the completion date.

19.4.1.5 Damage to the District or other contractor(s).

19.4.1.6 Unsatisfactory prosecution of the Work by the Contractor.

19.4.1.7 Failure to store and properly secure materials.

19.4.1.8 Failure of the Contractor to submit, on a timely basis, proper, sufficient, and acceptable documentation required by the Contract Documents, including, without limitation, a Construction Schedule, Schedule of Submittals, Schedule of Values, Monthly Progress Schedules, Shop Drawings, Product Data and samples, Proposed product lists, executed Change Orders, and/or verified reports.

19.4.1.9 Failure of the Contractor to maintain As-Builts.

19.4.1.10 Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment.

19.4.1.11 Unauthorized deviations from the Contract Documents.

19.4.1.12 Failure of the Contractor to prosecute the Work in a timely manner in compliance with the Construction Schedule, established progress schedules, and/or completion dates.

19.4.1.13 Failure to provide acceptable electronic certified payroll records, as required by the Labor Code, by these Contract Documents, or by written request; for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or by each Subcontractor in connection with the Work for the

period of the Application for Payment or if payroll records are delinquent or inadequate.

19.4.1.14 Failure to properly pay prevailing wages as required in Labor Code section 1720 et seq., failure to comply with any other Labor Code requirements, and/or failure to comply with labor compliance monitoring and enforcement by the DIR.

19.4.1.15 Allowing an unregistered subcontractor, as described in Labor Code section 1725.5, to engage in the performance of any work under this Contract.

19.4.1.16 Failure to comply with any applicable federal statutes and regulations regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon Act and related requirements, Contract Work Hours and Safety Standards Act requirements, if applicable.

19.4.1.17 Failure to properly maintain or clean up the Site.

19.4.1.18 Failure to timely indemnify, defend, or hold harmless the District.

19.4.1.19 Any payments due to the District, including but not limited to payments for failed tests, utilities changes, or permits.

19.4.1.20 Failure to pay Subcontractor(s) or supplier(s) as required by law and by the Contract Documents.

19.4.1.21 Failure to pay any royalty, license or similar fees.

19.4.1.22 Contractor is otherwise in breach, default, or in substantial violation of any provision of this Contract.

19.4.1.23 Failure to perform any implementation and/or monitoring required by any SWPPP for the Project and/or the imposition of any penalties or fines therefore whether imposed on the District or Contractor.

19.4.2 Reallocation of Withheld Amounts

19.4.2.1 District may, in its discretion, apply any withheld amount to pay outstanding claims or obligations as defined herein. In so doing, District shall make such payments on behalf of Contractor. If any payment is so made by District, then that amount shall be considered a payment made under Contract by District to Contractor and District shall not be liable to Contractor for any payment made in good faith. These payments may be made without prior judicial determination of claim or obligation. District will render Contractor an accounting of funds disbursed on behalf of Contractor.

19.4.2.2 If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision thereof, District may, after **FORTY-EIGHT (48)** hours' written notice to the Contractor and, without prejudice to any other remedy, make good such deficiencies. The District shall adjust the total Contract Price by reducing the amount thereof by the cost of

making good such deficiencies. If District deems it inexpedient to correct Work that is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract Price (of at least one hundred fifty percent (150%) of the estimated reasonable value of the nonconforming Work) shall be made therefor.

19.4.3 Payment After Cure

When Contractor removes the grounds for declining approval, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

19.5 Subcontractor Payments

19.5.1 Payments to Subcontractors

No later than seven (7) days after receipt, or pursuant to Business and Professions Code section 7108.5 and Public Contract Code section 7107, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Sub-subcontractors in a similar manner.

19.5.2 No Obligation of District for Subcontractor Payment

The District shall have no obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

19.5.3 Joint Checks

District shall have the right in its sole discretion, if necessary for the protection of the District, to issue joint checks made payable to the Contractor and Subcontractors and/or material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint check payment be construed to create any contract between the District and a Subcontractor of any tier, or a material or equipment supplier, any obligation from the District to such Subcontractor or a material or equipment supplier, or rights in such Subcontractor or a material or equipment supplier against the District.

20. COMPLETION OF THE WORK

20.1 Completion

20.1.1 District will accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District.

20.1.2 The Work may only be accepted as complete by action of the governing board of the District.

20.1.3 District, at its sole option, may accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District, except for minor corrective items, as distinguished from incomplete items. If Contractor fails to complete all minor corrective items within fifteen (15) days after the date of the District's acceptance of completion, District shall withhold from the final payment one hundred fifty percent (150%) of an estimate of the amount sufficient to complete the corrective items, as determined by District, until the item(s) are completed.

20.1.4 At the end of the 15-day period, if there are any items remaining to be corrected, District may elect to proceed as provided herein related to adjustments to Contract Price, and/or District's right to perform the Work of the Contractor.

20.2 Close-Out/Certification Procedures

20.2.1 Punch List

The Contractor shall notify the Architect when Contractor considers the Work complete. Upon notification, Architect will prepare a list of minor items to be completed or corrected ("Punch List"). The Contractor and/or its Subcontractors shall proceed promptly to complete and correct items on the Punch List. Failure to include an item on Punch List does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

20.2.2 Close-Out/Certification Requirements

20.2.2.1 Utility Connections

Buildings shall be connected to water, gas, sewer, and electric services, complete and ready for use. Service connections shall be made and existing services reconnected.

20.2.2.2 Record Drawings and Record Specifications

20.2.2.2.1 Contractor shall provide exact Record Drawings of the Work ("As-Builts") and Record Specifications upon completion of the Project and as a condition precedent to approval of final payment.

20.2.2.2.2 Contractor shall obtain the Inspector's approval of the corrected prints and employ a competent draftsman to transfer the Record Drawings information to the most current version of AutoCAD that is, at that time, currently utilized for plan check submission by either the District, the Architect, OPSC, and/or DSA, and print a complete set of transparent sepias. When completed, Contractor shall deliver corrected sepias and diskette/CD/other

20.2.2.2.3 Contractor is liable and responsible for any and all inaccuracies in the Record Drawings and Record Specifications, even if inaccuracies become evident at a future date.

20.2.2.3 Maintenance Manuals: Contractor shall prepare all operation and maintenance manuals and date as indicated in the Specifications.

20.2.2.4 Source Programming: Contractor shall provide all source programming for all items in the Project.

20.2.2.5 Verified Reports: Contractor shall completely and accurately fill out and file forms DSA 6-C or DSA 152 (or current form), as appropriate. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

20.3 Final Inspection

20.3.1 Contractor shall comply with Punch List procedures as provided herein, and maintain the presence of a Project Superintendent and Project Manager until the Punch List is complete to ensure proper and timely completion of the Punch List. Under no circumstances shall Contractor demobilize its forces prior to completion of the Punch List without District's prior written approval. Upon receipt of Contractor's written notice that all of the Punch List items have been fully completed and the Work is ready for final inspection and District acceptance, Architect and Project Inspector will inspect the Work and shall submit to Contractor and District a final inspection report noting the Work, if any, required in order to complete in accordance with the Contract Documents. Absent unusual circumstances, this report shall consist of the Punch List items not yet satisfactorily completed.

20.3.2 Upon Contractor's completion of all items on the Punch List and any other uncompleted portions of the Work, the Contractor shall notify the District and Architect, who shall again inspect such Work. If the Architect finds the Work complete and acceptable under the Contract Documents, the Architect will notify Contractor, who shall then jointly submit to the Architect and the District its final Application for Payment.

20.3.3 Final Inspection Requirements

20.3.3.1 Before calling for final inspection, Contractor shall determine that the following have been performed:

20.3.3.1.1 The Work has been completed.

20.3.3.1.2 All life safety items are completed and in working order.

20.3.3.1.3 Mechanical and electrical Work are complete and tested, fixtures are in place, connected, and ready for tryout.

20.3.3.1.4 Electrical circuits scheduled in panels and disconnect switches labeled.

20.3.3.1.5 Painting and special finishes complete.

20.3.3.1.6 Doors complete with hardware, cleaned of protective film, relieved of sticking or binding, and in working order.

20.3.3.1.7 Tops and bottoms of doors sealed.

20.3.3.1.8 Floors waxed and polished as specified.

20.3.3.1.9 Broken glass replaced and glass cleaned.

20.3.3.1.10 Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.

20.3.3.1.11 Work cleaned, free of stains, scratches, and other foreign matter, and damaged and broken material replaced.

20.3.3.1.12 Finished and decorative work shall have marks, dirt, and superfluous labels removed.

20.3.3.1.13 Final cleanup, as provided herein.

20.4 Costs of Multiple Inspections

More than two (2) requests of the District to make a final inspection shall be considered an additional service of District, Architect, Construction Manager, and/or Project Inspector, and all subsequent costs will be invoiced to Contractor and if funds are available, withheld from remaining payments.

20.5 Partial Occupancy or Use Prior to Completion

20.5.1 District's Rights to Occupancy

The District may occupy or use any completed or partially completed portion of the Work at any stage, and such occupancy shall not constitute the District's Final Acceptance of any part of the Work. Neither the District's Final Acceptance, the making of Final Payment, any provision in Contract Documents, nor the use or occupancy of the Work, in whole or in part, by District shall constitute acceptance of Work not in accordance with the Contract Documents nor relieve the Contractor or the Contractor's Performance Bond Surety from liability with respect to any warranties or responsibility for faulty or defective Work or materials, equipment and workmanship incorporated therein. In the event that the District occupies or uses any completed or partially completed portion of the Work, the Contractor shall remain responsible for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents unless the Contractor requests in writing, and the District agrees, to otherwise divide those responsibilities. Any dispute as to responsibilities shall be resolved pursuant to the Claims and Disputes provisions herein, with the added provision that during the dispute process, the District shall have the right to occupy or use any portion of the Work that it needs or desires to use.

20.5.2 Inspection Prior to Occupancy or Use

Immediately prior to partial occupancy or use, the District, the Contractor, and the Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

20.5.3 No Waiver

Unless otherwise agreed upon, partial or entire occupancy or use of a portion or portions of the Work shall not constitute beneficial occupancy or District's acceptance of the Work not complying with the requirements of the Contract Documents.

21. FINAL PAYMENT AND RETENTION

21.1 Final Payment

Upon receipt and approval of a valid and final Application for Payment, the Architect will issue a final Certificate of Payment. The District shall thereupon jointly inspect the Work and either accept the Work as complete or notify the Architect and the Contractor in writing of reasons why the Work is not complete. Upon District's acceptance of the Work of the Contractor as fully complete by the Governing Board of the District (that, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the District shall record a Notice of Completion with the County Recorder, and the Contractor shall, upon receipt of final payment from the District, pay the amount due Subcontractors.

21.2 Prerequisites for Final Payment

The following conditions must be fulfilled prior to Final Payment:

21.2.1 A full release of all Stop Payment Notices served in connection with the Work shall be submitted by Contractor.

21.2.2 A duly completed and executed conditional waiver and release upon final payment compliant with Civil Code section 8136, from the Contractor and each subcontractor of any tier and supplier to be paid from the final payment.

21.2.3 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134, from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payments.

21.2.4 A duly completed and executed Document 00 65 19.26, "AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS" from the Contractor.

21.2.5 The Contractor shall have made all corrections to the Work that are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of District required under the Contract Documents.

21.2.6 Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work.

21.2.7 Contractor must have completed all requirements set forth under "Close-Out/Certification Procedures," including, without limitation, submission of an approved set of complete Record Drawings.

21.2.8 Architect shall have issued its written approval that final payment can be made.

21.2.9 The Contractor shall have delivered to the District all manuals and materials required by the Contract Documents, which must be approved by the District.

21.2.10 The Contractor shall have completed final clean-up as provided herein.

21.3 Retention

21.3.1 The retention, less any amounts disputed by the District or that the District has the right to withhold pursuant to provisions herein, shall be paid:

21.3.1.1 After approval by the Architect of the Application and Certificate of Payment,

21.3.1.2 After the satisfaction of the conditions set forth herein, and

21.3.1.3 After forty-five (45) days after the recording of the Notice of Completion by District.

21.3.2 No interest shall be paid on any retention, or on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents, except as provided to the contrary in any Escrow Agreement between the District and the Contractor pursuant to Public Contract Code section 22300.

21.4 Substitution of Securities

The District will permit the substitution of securities in accordance with the provisions of Public Contract Code section 22300.

22. UNCOVERING OF WORK

If a portion of the Work is covered without Inspector or Architect approval or not in compliance with the Contract Documents, it must, if required in writing by the District, the Project Inspector, or the Architect, be uncovered for the Project Inspector's or the Architect's observation and be corrected, replaced, and/or recovered at the Contractor's expense without change in the Contract Price or Contract Time.

23. NONCONFORMING WORK AND CORRECTION OF WORK

23.1 Nonconforming Work

23.1.1 Contractor shall promptly remove from Premises all Work identified by District as failing to conform to the Contract Documents whether incorporated or not. Contractor shall promptly replace and re-execute its own Work to comply with the Contract Documents without additional expense to the District and shall bear the expense of making good all work of other contractors destroyed or damaged by any removal or replacement pursuant hereto and/or any delays to the District or other Contractors caused thereby.

23.1.2 If Contractor does not remove Work that District has identified as failing to conform to the Contract Documents within a reasonable time, not to exceed **FORTY-EIGHT (48)** hours, District may remove it and may store any material at

Contractor's expense. If Contractor does not pay expense(s) of that removal within ten (10) days' time thereafter, District may, upon ten (10) days' written notice, sell any material at auction or at private sale and shall deduct all costs and expenses incurred by the District and/or District may withhold those amounts from payment(s) to Contractor.

23.2 Correction of Work

23.2.1 Correction of Rejected Work

Pursuant to the notice provisions herein, the Contractor shall immediately correct the Work rejected by the District, the Architect, or the Project Inspector as failing to conform to the requirements of the Contract Documents, whether observed before or after Completion and whether or not fabricated, installed, or completed. The Contractor shall bear costs of correcting the rejected Work, including additional testing, inspections, and compensation for the Inspector's or the Architect's services and expenses made necessary thereby.

23.2.2 One-Year Warranty Corrections

If, within one (1) year after the date of Completion of the Work or a designated portion thereof, or after the date for commencement of warranties established hereunder, or by the terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the District to do so. This period of one (1) year shall be extended with respect to portions of the Work first performed after Completion by the period of time between Completion and the actual performance of the Work. This obligation hereunder shall survive District's acceptance of the Work under the Contract and termination of the Contract. The District shall give such notice promptly after discovery of the condition.

23.3 District's Right to Perform Work

23.3.1 If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this contract, the District, after **FORTY-EIGHT (48)** hours written notice to the Contractor, may, without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

23.3.2 If it is found at any time, before or after completion of the Work, that Contractor has varied from the Drawings and/or Specifications, including, but not limited to, variation in material, quality, form, or finish, or in the amount or value of the materials and labor used, District may require at its option:

23.3.2.1 That all such improper Work be removed, remade or replaced, and all work disturbed by these changes be made good by Contractor at no additional cost to the District;

23.3.2.2 That the District deduct from any amount due Contractor the sum of money equivalent to the difference in value between the work performed and that called for by the Drawings and Specifications; or

23.3.2.3 That the District exercise any other remedy it may have at law or under the Contract Documents, including but not limited to the District hiring its own forces or another contractor to replace the Contractor's nonconforming Work, in which case the District shall either issue a deductive Change Order, a Construction Change Directive, or invoice the Contractor for the cost of that work. Contractor shall pay any invoices within thirty (30) days of receipt of same or District may withhold those amounts from payment(s) to Contractor.

24. TERMINATION AND SUSPENSION

24.1 District's Request for Assurances

If District at any time reasonably believes Contractor is or may be in default under this Contract, District may in its sole discretion notify Contractor of this fact and request written assurances from Contractor of performance of Work and a written plan from Contractor to remedy any potential default under the terms this Contract that the District may advise Contractor of in writing. Contractor shall, within ten (10) calendar days of District's request, deliver a written cure plan that meets the District's requirements in its request for assurances. Contractor's failure to provide such written assurances of performance and the required written plan, within ten (10) calendar days of request, will constitute a material breach of this Contract sufficient to justify termination for cause.

24.2 District's Right to Terminate Contractor for Cause

24.2.1 Grounds for Termination: The District, in its sole discretion, may terminate the Contract and/or terminate the Contractor's right to perform the work of the Contract based upon any of the following:

24.2.1.1 Contractor refuses or fails to execute the Work or any separable part thereof with sufficient diligence as will ensure its completion within the time specified or any extension thereof, or

24.2.1.2 Contractor fails to complete said Work within the time specified or any extension thereof, or

24.2.1.3 Contractor persistently fails or refuses to perform Work or provide material of sufficient quality as to be in compliance with Contract Documents; or

24.2.1.4 Contractor persistently refuses, or repeatedly fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials to complete the Work in the time specified; or

24.2.1.5 Contractor fails to make prompt payment to Subcontractors, or for material, or for labor; or

24.2.1.6 Contractor persistently disregards laws, or ordinances, or instructions of District; or

24.2.1.7 Contractor fails to supply labor, including that of Subcontractors, that is sufficient to prosecute the Work or that can work in harmony with all other elements of labor employed or to be employed on the Work; or

24.2.1.8 Contractor or its Subcontractor(s) is/are otherwise in breach, default, or in substantial violation of any provision of this Contract, including but not limited to a lapse in licensing or registration.

24.2.2 Notification of Termination

24.2.2.1 Upon the occurrence at District's sole determination of any of the above conditions, District may, without prejudice to any other right or remedy, serve written notice upon Contractor and its Surety of District's termination of this Contract and/or the Contractor's right to perform the work of the Contract. This notice will contain the reasons for termination. Unless, within three (3) days after the service of the notice, any and all condition(s) shall cease, and any and all violation(s) shall cease, or arrangement satisfactory to District for the correction of the condition(s) and/or violation(s) be made, this Contract and/or the Contractor's right to perform the Work of the Contract shall cease and terminate. Upon termination, Contractor shall not be entitled to receive any further payment until the entire Work is finished.

24.2.2.2 Upon Termination, District may immediately serve written notice of tender upon Surety whereby Surety shall have the right to take over and perform this Contract only if Surety:

24.2.2.2.1 Within three (3) days after service upon it of the notice of tender, gives District written notice of Surety's intention to take over and perform this Contract; and

24.2.2.2.2 Commences performance of this Contract within three (3) days from date of serving of its notice to District.

24.2.2.3 Surety shall not utilize Contractor in completing the Project if the District notifies Surety of the District's objection to Contractor's further participation in the completion of the Project. Surety expressly agrees that any contractor which Surety proposes to fulfill Surety's obligations is subject to District's approval. District's approval shall not be unreasonably withheld, conditioned or delayed.

24.2.2.4 If Surety fails to notify District or begin performance as indicated herein, District may take over the Work and execute the Work to completion by any method it may deem advisable at the expense of Contractor and/or its Surety. Contractor and/or its Surety shall be liable to District for any excess cost or other damages the District incurs thereby. Time is of the essence in this Contract. If the District takes over the Work as herein provided, District may, without liability for so doing, take possession of and utilize in completing the Work such materials, appliances, plan, and other property belonging to Contractor as may be on the Site of the Work, in bonded storage, or previously paid for.

24.3 Termination of Contractor for Convenience

24.3.1 District in its sole discretion may terminate the Contract in whole or in part upon three (3) days' written notice to the Contractor.

24.3.2 Upon notice, Contractor shall:

24.3.2.1 Cease operations as directed by the District in the notice;

24.3.2.2 Take necessary actions for the protection and preservation of the Work as soon as possible; and

24.3.2.3 Terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

24.3.3 Within 30 days of the notice, Contractor submit to the District a payment application for the actual cost for labor, materials, and services performed, including all Contractor's and Subcontractor(s)' mobilization and/or demobilization costs, that is unpaid. Contractor shall have no claims against the District except for the actual cost for labor, materials, and services performed that adequately documented through timesheets, invoices, receipts, or otherwise. District shall pay all undisputed invoice(s) for work performed until the notice of termination.

24.3.4 Under a termination for convenience, the District retains the right to all the options available to the District if there is a termination for cause.

24.4 **Effect of Termination**

24.4.1 Contractor shall, only if ordered to do so by the District, immediately remove from the Site all or any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The District retains the right, but not the obligation, to keep and use any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The Contractor and its Surety shall be liable upon the Performance Bond for all damages caused to the District by reason of the Contractor's failure to complete the Contract.

24.4.2 In the event that the District shall perform any portion of, or the whole of the Work, pursuant to the provisions of the General Conditions, the District shall not be liable nor account to the Contractor in any way for the time within which, or the manner in which, the Work is performed by the District or for any changes the District may make in the Work or for the money expended by the District in satisfying claims and/or suits and/or other obligations in connection with the Work.

24.4.3 In the event termination for cause is determined to have not been for cause, the termination shall be deemed to have been a termination for convenience effective as of the same date as the purported termination for cause.

24.4.4 In the event that the Contract is terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by the Contractor or any impact or impairment of Contractor's bonding capacity.

24.4.5 If the expense to the District to finish the Work exceeds the unpaid Contract Price, Contractor and Surety shall pay difference to District within twenty-one (21) days of District's request.

24.4.6 The District shall have the right (but shall have no obligation) to assume and/or assign to a general contractor or construction manager or other third party who is qualified and has sufficient resources to complete the Work, the rights of the

Contractor under its subcontracts with any or all Subcontractors. In the event of an assumption or assignment by the District, no Subcontractor shall have any claim against the District or third party for Work performed by Subcontractor or other matters arising prior to termination of the Contract. The District or any third party, as the case may be, shall be liable only for obligations to the Subcontractor arising after assumption or assignment. Should the District so elect, the Contractor shall execute and deliver all documents and take all steps, including the legal assignment of its contractual rights, as the District may require, for the purpose of fully vesting in the District the rights and benefits of its Subcontractor under Subcontracts or other obligations or commitments. All payments due the Contractor hereunder shall be subject to a right of offset by the District for expenses and damages suffered by the District as a result of any default, acts, or omissions of the Contractor. Contractor must include this assignment provision in all of its contracts with its Subcontractors.

24.4.7 The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to District.

24.5 Emergency Termination of Public Contracts Act of 1949

24.5.1 This Contract is subject to termination as provided by sections 4410 and 4411 of the Government Code of the State of California, being a portion of the Emergency Termination of Public Contracts Act of 1949.

24.5.1.1 Section 4410 of the Government Code states:

In the event a national emergency occurs, and public work, being performed by contract, is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the public agency and the contractor may, by written agreement, terminate said contract.

24.5.1.2 Section 4411 of the Government Code states:

Such an agreement shall include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party shall pay to the other or any other person, under the facts and circumstances in the case.

24.5.2 Compensation to the Contractor shall be determined at the sole discretion of District on the basis of the reasonable value of the Work done, including preparatory work. As an exception to the foregoing and at the District's discretion, in the case of any fully completed separate item or portion of the Work for which there is a separate previously submitted unit price or item on the accepted schedule of values, that price shall control. The District, at its sole discretion, may adopt the Contract Price as the reasonable value of the work done or any portion thereof.

24.6 Suspension of Work

24.6.1 District in its sole discretion may suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine upon three (3) days written notice to the Contractor.

24.6.1.1 An adjustment may be made for changes in the cost of performance of the Work caused by any such suspension, delay or interruption. No adjustment shall be made to the extent:

24.6.1.1.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible; or

24.6.1.1.2 That an equitable adjustment is made or denied under another provision of the Contract; or

24.6.1.1.3 That the suspension of Work was the direct or indirect result of Contractor's failure to perform any of its obligations hereunder.

24.6.1.2 Any adjustments in cost of performance may have a fixed or percentage fee as provided in the section on Format for Proposed Change Order herein. This amount shall be full compensation for all Contractor's and its Subcontractor(s)' changes in the cost of performance of the Contract caused by any such suspension, delay or interruption.

25. CLAIMS PROCESS

25.1 Obligation to File Claims for Disputed Work

25.1.1 Should Contractor otherwise seek extra time or compensation for any reason whatsoever ("Disputed Work"), then Contractor shall first follow procedures set forth in the Contract Documents including, without limitation, Articles 15, 16 and 17. A Notice of Potential Change or Proposed Change Order are less formal procedures that proceed the formal claim and do not constitute a Claim. A Claim also does not include correspondence, RFIs, vouchers, invoices, progress payment applications, or other routine or authorized form of requests for progress payments in compliance with the Contract. If a dispute remains, then Contractor shall give written notice to Owner that expressly invokes this Article 25 within the time limits set forth herein.

25.1.2 Contractor's sole and exclusive remedy for Disputed Work is to file a written claim setting forth Contractor's position as required herein within the time limits set forth herein.

25.2 Duty to Perform during during Claims Process

Contractor and its subcontractors shall continue to perform its Work under the Contract including the disputed work, and shall not cause a delay of the Work during any dispute, claim, negotiation, mediation, or arbitration proceeding, except by written agreement by the District.

25.3 Definition of a Claim

25.3.1 Pursuant to Public Contract Code section 9204, the term "Claim" means a separate demand by the Contractor, sent by registered mail or certified mail with return receipt requested, for one or more of the following:

25.3.1.1 A time extension, including without limitation, for relief of damages or penalties for delay assessed by the District under the Contract;

25.3.1.2 Payment by the District of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or to which Contractor is not otherwise entitled to; or

25.3.1.3 An amount of payment disputed by the District.

25.4 Claims Presentation

25.4.1 Form and Contents of Claim

25.4.1.1 If Contractor intends to apply for an increase in the Contract Price or Contract Time for any reason including, without limitation, the acts of District or its agents, Contractor shall, within thirty (30) days after the event giving rise to the Claim, give notice of the Claim in writing specifically identifying Contractor is invoking this Article 25 Claims Presentation.

25.4.1.2 The Claim shall include an itemized statement of the details and amounts of its Claim for any increase in the Contract Price of Contract Time as provided below, including a Time Impact Analysis and any and all other documentation substantiating Contractor's claimed damages:

25.4.1.2.1 The issues, events, conditions, circumstances and/or causes giving rise to the dispute, and shall show, in detail, the cause and effect of same;

25.4.1.2.2 Citation to provisions in the Contract Documents, statute sections, and/or case law entitling Contractor to an increase in the Contract Price or Contract Time;

25.4.1.2.3 The pertinent dates and/or durations and actual and/or anticipated effects on the Contract Price, Contract Schedule milestones and/or Contract Time adjustments;

25.4.1.2.4 The Time Impact Analysis of all time delays that shows actual time impact on the critical path; and

25.4.1.2.5 The line-item costs for labor, material, and/or equipment, if applicable, for all cost impacts priced like a change order according to Article 17 and must be updated monthly as to cost and entitlement if a continuing claim.

25.4.1.3 The Claim shall include the following certification by the Contractor:

25.4.1.3.1 The undersigned Contractor certifies under penalty of perjury that the attached dispute is made in good faith; that the supporting data is accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the adjustment for which Contractor believes the District is liable; and that I am duly authorized to certify the dispute on behalf of the Contractor.

25.4.1.3.2 Furthermore, Contractor understands that the value of the attached dispute expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from the Work performed on the Project, additional time required on the Project and/or resulting from delay to the Project including, without limitation, cumulative impacts. Contractor may not separately recover for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

25.4.2 Contractor shall bear all costs incurred in the preparation and submission of a claim.

25.4.3 Failure to timely submit a claim and the requisite supporting documentation shall constitute a waiver of Contractor's claim(s) against the District and Contractor's claims for compensation or an extension of time shall be forfeited and invalidated.

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25.5 Claim Resolution pursuant to Public Contract Code section 9204

Contractor may request to waive the claims procedure under Public Contract Code section 9204 and proceed directly to the commencement of a civil action or binding arbitration. If Contractor chooses to proceed, Contractor shall comply with the following steps.

25.5.1 STEP 1:

25.5.1.1 Upon receipt of a Claim by registered or certified mail, return receipt requested, including the documents necessary to substantiate it, the District shall conduct a reasonable review of the Claim and, within a period **not to exceed 45 days**, shall provide the Contractor a written statement identifying what portion of the Claim is disputed and what portion is undisputed. Upon receipt of a Claim, the District and Contractor may, **by mutual agreement, extend the time period** to provide a written statement. If the District needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the Claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of Claim sent by registered mail or certified mail, return receipt requested, the District shall have **up to three (3) days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension**, expires to provide Contractor a written statement identifying the disputed portion and the undisputed portion.

25.5.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District issues its written

statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.5.1.2 Upon receipt of a Claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable. In this instance, District and Contractor must comply with the sections below regarding Public Contract Code section 20104 et seq. and Government Code Claim Act Claims.

25.5.1.3 If the District fails to issue a written statement, or to otherwise meet the time requirements of this section, this shall result in the Claim being deemed rejected in its entirety. A claim that is denied by reason of the District's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of Contractor.

25.5.2 STEP 2:

25.5.2.1 If Contractor disputes the District's written response, or if the District fails to respond to a Claim within the time prescribed, Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the District shall schedule a meet and confer conference within 30 days for settlement of the dispute. Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the District shall provide the Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed.

25.5.2.1.1.1 Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the District issues its written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.5.3 STEP 3:

25.5.3.1 Any disputed portion of the claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with the District and Contractor sharing the associated costs equally. The District and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

25.5.3.1.1 For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in

dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

25.5.3.2 Unless otherwise agreed to by the District and Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code section 20104.4 to mediate after litigation has been commenced.

25.5.4 STEP 4:

25.5.4.1 If mediation under this section does not resolve the parties' dispute, the District may, but does not require arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program.

25.6 Subcontractor Pass-Through Claims

25.6.1 If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a District because privity of contract does not exist, the contractor may present to the District a Claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that Contractor present a Claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the Claim be presented to the District shall furnish reasonable documentation to support the Claim.

25.6.2 Within 45 days of receipt of this written request from a subcontractor, Contractor shall notify the subcontractor in writing as to whether the Contractor presented the Claim to the District and, if Contractor did not present the Claim, provide the subcontractor with a statement of the reasons for not having done so.

25.6.3 The Contractor shall bind all its Subcontractors to the provisions of this section and will hold the District harmless against Claims by Subcontractors.

25.7 Government Code Claim Act Claim

25.7.1 If a claim, or any portion thereof, remains in dispute upon satisfaction of all applicable Claim Resolution requirements the Contractor shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Contractor's right to bring a civil action against the District.

25.7.2 Contractor shall bear all costs incurred in the preparation, submission and administration of a Claim. Any claims presented in accordance with the Government Code must affirmatively indicate Contractor's prior compliance with the claims procedure herein of the claims asserted.

25.7.3 For purposes of those provisions, the running of the time within which a claim pursuant to Public Contract Code section 20104.2 only must be presented to the District shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet

and confer process, including any period of time utilized by the meet and confer process.

25.8 Claim Resolution pursuant to Public Contract Code section 20104 et seq.

25.8.1 In the event of a disagreement between the parties as to performance of the Work, the interpretation of this Contract, or payment or nonpayment for Work performed or not performed, the parties shall attempt to resolve all Claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between Contractor and District by those procedures set forth in Public Contract Code section 20104, et seq., to the extent applicable.

25.8.1.1 Contractor shall file with the District any written Claim, including the documents necessary to substantiate it, upon the application for final payment.

25.8.1.2 For claims of less than fifty thousand dollars (\$50,000), the District shall respond in writing within forty-five (45) days of receipt of the Claim or may request in writing within thirty (30) days of receipt of the Claim any additional documentation supporting the claim or relating to defenses or claims the District may have against the Contractor.

25.8.1.2.1 If additional information is required, it shall be requested and provided by mutual agreement of the parties.

25.8.1.2.2 District's written response to the documented Claim shall be submitted to the Contractor within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor to produce the additional information, whichever is greater.

25.8.1.3 For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the District shall respond in writing to all written Claims within sixty (60) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the Claim any additional documentation supporting the Claim or relating to defenses or claims the District may have against the Contractor.

25.8.1.3.1 If additional information is required, it shall be requested and provided upon mutual agreement of the District and the Contractor.

25.8.1.3.2 The District's written response to the claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor to produce the additional information or requested documentation, whichever is greater.

25.8.1.4 If Contractor disputes the District's written response, or the District fails to respond within the time prescribed, Contractor may so notify the District, in writing, either within fifteen (15) days of receipt of the District's response or within fifteen (15) days of the District's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the District shall

schedule a meet and confer conference within thirty (30) days for settlement of the dispute.

25.8.1.5 Following the meet and confer conference, if the claim or any portion of it remains in dispute, the Contractor may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions the running of the time within which a claim must be filed shall be tolled from the time the Contractor submits its written Claim until the time the Claim is denied, including any period of time utilized by the meet and confer process.

25.8.1.6 For any civil action filed to resolve claims filed pursuant to this section, within sixty (60) days, but no earlier than thirty (30) days, following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

25.8.1.7 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of the Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986, (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

25.8.1.8 The District shall not fail to pay money as to any portion of a Claim which is undisputed except as otherwise provided in the Contract Documents. In any suit filed pursuant to this section, the District shall pay interest due at the legal rate on any arbitration award or judgment. Interest shall begin to accrue on the date the suit is filed in a court of law.

25.8.2 Contractor shall bind its Subcontractors to the provisions of this Section and will hold the District harmless against disputes by Subcontractors.

25.9 Claim Procedure Compliance

25.9.1 Failure to submit and administer claims as required in Article 25 shall waive Contractor's right to claim on any specific issues not included in a timely submitted claim. Claim(s) not raised in a timely protest and timely claim submitted under this Article 25 may not be asserted in any subsequent litigation, Government Code Claim, or legal action.

25.9.2 District shall not be deemed to waive any provision under this Article 25, if at Owner's sole discretion, a claim is administered in a manner not in accord with this Article 25. Waivers or modifications of this Article 25 may only be made by a

signed change order approved as to form by legal counsel for both District and Contractor; oral or implied modifications shall be ineffective.

25.10 Claim Resolution Non-Applicability

25.10.1 The procedures for dispute and claim resolutions set forth in this Article shall not apply to the following:

25.10.1.1 Personal injury, wrongful death or property damage claims;

25.10.1.2 Latent defect or breach of warranty or guarantee to repair;

25.10.1.3 Stop payment notices;

25.10.1.4 District's rights set forth in the Article on Suspension and Termination;

25.10.1.5 Disputes arising out of labor compliance enforcement by the Department of Industrial Relations; or

25.10.1.6 District rights and obligations as a public entity set forth in applicable statutes; provided, however, that penalties imposed against a public entity by statutes, including, but not limited to, Public Contract Code sections 20104.50 and 7107, shall be subject to the Claim Resolution requirements provided in this Article.

25.11 Attorney's Fees

25.11.1 Should litigation be necessary to enforce any terms or provisions of this Agreement, then each party shall bear its own litigation and collection expenses, witness fees, court costs, and attorney's fees.

26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS

26.1 Labor Compliance and Enforcement

Since this Project is subject to labor compliance and enforcement by the Department of Industrial Relations ("DIR"), Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code and Title 8 of the California Code of Regulations, including, without limitation, the requirement that the Contractor and all Subcontractors shall timely furnish complete and accurate electronic certified payroll records directly to the DIR. The District may not issue payment if this requirement is not met.

26.2 Wage Rates, Travel, and Subsistence

26.2.1 Pursuant to the provisions of Article 2 (commencing at section 1770), Chapter 1, Part 7, Division 2, of the Labor Code, the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public work is to be performed for each craft, classification, or type of worker needed to execute this Contract are on file at the District's principal office and copies will be made available to any interested party on request. Contractor shall obtain and post a copy of these wage rates at the job site.

26.2.2 Holiday and overtime work, when permitted by law, shall be paid for at the general prevailing rate of per diem wages for holiday and overtime work on file with the Director of the Department of Industrial Relations, unless otherwise specified. The holidays upon which those rates shall be paid need not be specified by the District, but shall be all holidays recognized in the applicable collective bargaining agreement. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code.

26.2.3 Contractor shall pay and shall cause to be paid each worker engaged in Work on the Project the general prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations, regardless of any contractual relationship which may be alleged to exist between Contractor or any Subcontractor and such workers.

26.2.4 If during the period this bid is required to remain open, the Director of the Department of Industrial Relations determines that there has been a change in any prevailing rate of per diem wages in the locality in which the Work under the Contract is to be performed, such change shall not alter the wage rates in the Notice to Bidders or the Contract subsequently awarded.

26.2.5 Pursuant to Labor Code section 1775, Contractor shall, as a penalty to District, forfeit the statutory amount (believed by the District to be currently up to two hundred dollars (\$200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates, determined by the District and/or the Director, for the work or craft in which that worker is employed for any public work done under Contract by Contractor or by any Subcontractor under it. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by Contractor.

26.2.6 Any worker employed to perform Work on the Project, which Work is not covered by any classification listed in the general prevailing wage rate of per diem wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by him, and such minimum wage rate shall be retroactive to time of initial employment of such person in such classification.

26.2.7 Pursuant to Labor Code section 1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel time, subsistence pay, and apprenticeship or other training programs authorized by Labor Code section 3093, and similar purposes.

26.2.8 Contractor shall post at appropriate conspicuous points on the Site of Project, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned. In addition, Contractor shall post a sign-in log for all workers and visitors to the Site, a list of all subcontractors of any tier on the Site, and the required Equal Employment Opportunity poster(s).

26.3 Hours of Work

26.3.1 As provided in article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code, eight (8) hours of labor shall constitute a legal day's

work. The time of service of any worker employed at any time by Contractor or by any Subcontractor on any subcontract under this Contract upon the Work or upon any part of the Work contemplated by this Contract shall be limited and restricted by Contractor to eight (8) hours per day, and forty (40) hours during any one week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, Work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week, shall be permitted upon this public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

26.3.2 Contractor shall keep and shall cause each Subcontractor to keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by Contractor in connection with the Work or any part of the Work contemplated by this Contract. The record shall be kept open at all reasonable hours to the inspection of District and to the Division of Labor Standards Enforcement of the DIR.

26.3.3 Pursuant to Labor Code section 1813, Contractor shall as a penalty to the District forfeit the statutory amount (believed by the District to be currently twenty-five dollars (\$25)) for each worker employed in the execution of this Contract by Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code.

26.3.4 Any Work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to the District.

26.4 **Payroll Records**

26.4.1 Contractor shall upload, and shall cause each Subcontractor performing any portion of the Work under this Contract to upload, an accurate and complete certified payroll record ("CPR") electronically using DIR's eCPR System by uploading the CPRs by electronic XML file or entering each record manually using the DIR's iform (or current form) online on a weekly basis and within ten (10) days of any request by the District or Labor Commissioner at <http://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html> or current application and URL, showing the name, address, social security number, work classification, straight-time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work.

26.4.1.1 The CPRs enumerated hereunder shall be filed directly with the DIR on a weekly basis or to the requesting party, whether the District or DIR, within ten (10) days after receipt of each written request. The CPRs from the Contractor and each Subcontractor for each week shall be provided on or before Wednesday of the week following the week covered by the CPRs. District may not make any payment to Contractor until:

26.4.1.1.1 Contractor and/or its Subcontractor(s) provide CPRs acceptable to the DIR; and

26.4.1.1.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs to the DIR in a timely manner may directly delay Contractor's payment.

26.4.2 All CPRs shall be available for inspection at all reasonable hours at the principal office of Contractor on the following basis:

26.4.2.1 A certified copy of an employee's CPR shall be made available for inspection or furnished to the employee or his/her authorized representative on request.

26.4.2.2 CPRs shall be made available for inspection or furnished upon request to a representative of District, Division of Labor Standards Enforcement, Division of Apprenticeship Standards, and/or the DIR.

26.4.2.3 CPRs shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through the District, Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested CPRs have not been provided pursuant to the provisions herein, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by Contractor, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of Contractor.

26.4.3 Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by District, Division of Apprenticeship Standards, or Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of Contractor awarded Contract or performing Contract shall not be marked or obliterated.

26.4.4 Contractor shall inform District of the location of the records enumerated hereunder, including the street address, city, and county, and shall, within five (5) working days, provide a notice of change of location and address.

26.4.5 In the event of noncompliance with the requirements of this section, Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects Contractor must comply with this section. Should noncompliance still be evident after the ten (10) day period, Contractor shall, as a penalty to District, forfeit up to one hundred dollars (\$100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Labor Commissioner, these penalties shall be withheld from progress payments then due.

26.4.6 **[RESERVED]**

26.5 **[RESERVED]**

26.6 **Apprentices**

26.6.1 Contractor acknowledges and agrees that, if this Contract involves a dollar amount greater than or a number of working days greater than that specified in Labor Code section 1777.5, then this Contract is governed by the provisions of Labor Code Section 1777.5. It shall be the responsibility of Contractor to ensure

compliance with this Article and with Labor Code section 1777.5 for all apprenticeship occupations.

26.6.2 Apprentices of any crafts or trades may be employed and, when required by Labor Code section 1777.5, shall be employed provided they are properly registered in full compliance with the provisions of the Labor Code.

26.6.3 Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which she/he is registered.

26.6.4 Only apprentices, as defined in section 3077 of the Labor Code, who are in training under apprenticeship standards and written apprentice agreements under chapter 4 (commencing at section 3070), division 3, of the Labor Code, are eligible to be employed. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.

26.6.5 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractors employing workers in any apprenticeable craft or trade in performing any Work under this Contract shall apply to the applicable joint apprenticeship committee for a certificate approving the Contractor or Subcontractor under the applicable apprenticeship standards and fixing the ratio of apprentices to journeymen employed in performing the Work.

26.6.6 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractor may be required to make contributions to the apprenticeship program.

26.6.7 If Contractor or Subcontractor willfully fails to comply with Labor Code section 1777.5, then, upon a determination of noncompliance by the Administrator of Apprenticeship, it shall:

26.6.7.1 Be denied the right to bid on any subsequent project for one (1) year from the date of such determination;

26.6.7.2 Forfeit as a penalty to District the full amount as stated in Labor Code section 1777.7. Interpretation and enforcement of these provisions shall be in accordance with the rules and procedures of the California Apprenticeship Council and under the authority of the Chief of the Division of Apprenticeship Standards.

26.6.8 Contractor and all Subcontractors shall comply with Labor Code section 1777.6, which section forbids certain discriminatory practices in the employment of apprentices.

26.6.9 Contractor shall become fully acquainted with the law regarding apprentices prior to commencement of the Work. Special attention is directed to sections 1777.5, 1777.6, and 1777.7 of the Labor Code, and title 8, California Code of Regulations, section 200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, 9th floor, San Francisco, California 94102.

26.7 Non-Discrimination

26.7.1 Contractor herein agrees to comply with the provisions of the California Fair Employment and Housing Act as set forth in part 2.8 of division 3 of the California Government Code, commencing at section 12900; the Federal Civil Rights Act of 1964, as set forth in Public Law 88-352, and all amendments thereto; Executive Order 11246; and all administrative rules and regulations found to be applicable to Contractor and Subcontractor.

26.7.2 Special requirements for Federally Assisted Construction Contracts: During the performance of this Contract, Contractor agrees to incorporate in all subcontracts the provisions set forth in Chapter 60-1.4(b) of Title 41 published in Volume 33 No. 104 of the Federal Register dated May 28, 1968.

26.8 Labor First Aid

Contractor shall maintain emergency first aid treatment for Contractor's workers on the Project which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 *et seq.*) and the California Occupational Safety and Health Act of 1973 (Lab. Code, § 6300 *et seq.*; 8 Cal. Code of Regs., § 330 *et seq.*).

27. [RESERVED]

28. MISCELLANEOUS

28.1 Assignment of Antitrust Actions

28.1.1 Section 7103.5(b) of the Public Contract Code states:

In entering into a public works contract or subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, which assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

28.1.2 Section 4552 of the Government Code states:

In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder.

28.1.3 Section 4553 of the Government Code states:

If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

28.1.4 Section 4554 of the Government Code states:

Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action.

28.1.5 Under this Article, "public purchasing body" is District and "bidder" is Contractor.

28.2 **Excise Taxes**

If, under Federal Excise Tax Law, any transaction hereunder constitutes a sale on which a Federal Excise Tax is imposed and the sale is exempt from such Federal Excise Tax because it is a sale to a State or Local Government for its exclusive use, District, upon request, will execute documents necessary to show (1) that District is a political subdivision of the State for the purposes of such exemption, and (2) that the sale is for the exclusive use of District. No Federal Excise Tax for such materials shall be included in any Contract Price.

28.3 **Taxes**

Contract Price is to include any and all applicable sales taxes or other taxes that may be due in accordance with section 7051 et seq. of the Revenue and Taxation Code, Regulation 1521 of the State Board of Equalization or any other tax code that may be applicable.

28.4 **Shipments**

Contractor is responsible for any or all damage or loss to shipments until delivered and accepted on Site, as indicated in the Contract Documents. There must be no charge for containers, packing, unpacking, drayage, or insurance. The total Contract Price shall be all inclusive (including sales tax) and no additional costs of any type will be considered.

28.5 **Compliance with Government Reporting Requirements**

If this Contract is subject to federal or other governmental reporting requirements because of federal or other governmental financing in whole or in part for the Project of which it is part, or for any other reason, Contractor shall comply with those reporting requirements at the request of the District at no additional cost.

END OF DOCUMENT

DOCUMENT 00 73 13

SPECIAL CONDITIONS

THIS DOCUMENT MUST BE ADAPTED FOR EACH PROJECT – Delete any provision that is not applicable or if no change from the provision in the General Conditions.

*** THIS LIST OF SPECIAL CONDITION PROVISIONS IS FOR REFERENCE ONLY. REMOVE THIS PAGE BEFORE USING THIS DOCUMENT. ***

1. Mitigation Measures
2. Modernization Projects
3. Badge Policy for Contractors
4. Substitution for Specified Items
5. Weather Days
6. Owner-Controlled or Wrap-Up Insurance Program
7. Insurance Policy Limits
8. Permits, Certificates, Licenses, Fees, Approval
9. Project Labor Agreement/Payroll Records
10. As-Builts and Record Drawings
11. Disabled Veteran Business Enterprises
12. Construction Manager
13. Program Manager
14. Federal Funds
15. Preliminary Schedule of Values

DOCUMENT 00 73 13

SPECIAL CONDITIONS

1. Mitigation Measures

Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act. (Public Resources Code section 21000 *et seq.*)

2. Modernization Projects

2.1 Access. Access to the school buildings and entry to buildings, classrooms, restrooms, mechanical rooms, electrical rooms, or other rooms, for construction purposes, must be coordinated with District and onsite District personnel before Work is to start. Unless agreed to otherwise in writing, only a school custodian will be allowed to unlock and lock doors in existing building(s). The custodian will be available only while school is in session. If a custodian is required to arrive before 7:00 a.m. or leave after 3:30 p.m. to accommodate Contractor's Work, the overtime wages for the custodian will be paid by the Contractor, unless at the discretion of the District, other arrangements are made in advance.

2.2 Keys. Upon request, the District may, at its own discretion, provide keys to the school site for the convenience of the Contractor. The Contractor agrees to pay all expenses to re-key the entire school site and all other affected District buildings if the keys are lost or stolen, or if any unauthorized party obtains a copy of a key or access to the school.

2.3 Maintaining Services. The Contractor is advised that Work is to be performed in spaces regularly scheduled for instruction. Interruption and/or periods of shutdown of public access, electrical service, water service, lighting, or other utilities shall be only as arranged in advance with the District. Contractor shall provide temporary services to all facilities interrupted by Contractor's Work.

2.4 Maintaining Utilities. The Contractor shall maintain in operation during duration of Contract, drainage lines, storm drains, sewers, water, gas, electrical, steam, and other utility service lines within working area.

2.5 Confidentiality. Contractor shall maintain the confidentiality of all information, documents, programs, procedures and all other items that Contractor encounters while performing the Work. This requirement shall be ongoing and shall survive the expiration or termination of this Contract and specifically includes, without limitation, all student, parent, and employee disciplinary information and health information.

2.6 Work during Instructional Time. By submitting its bid, Contractor affirms that Work may be performed during ongoing instruction in existing facilities. If so, Contractor agrees to cooperate to the best of its ability to minimize any disruption to

school operations and any use of school facilities by the public up to, and including, rescheduling specific work activities, at no additional cost to District.

2.7 No Work during Student Testing. Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State or Federally-required tests.

3. Badge Policy for Contractors

All Contractors doing work for the District will provide their workers with identification badges. These badges will be worn by all members of the Contractor's staff who are working in a District facility.

3.1 Badges must be filled out in full and contain the following information:

3.1.1 Name of Contractor

3.1.2 Name of Employee

3.1.3 Contractor's address and phone number

3.2 Badges are to be worn when the Contractor or his/her employees are on site and must be visible at all times. Contractors must inform their employees that they are required to allow District employees, the Architect, the Construction Manager, the Program Manager, or the Project Inspector to review the information on the badges upon request.

3.3 Continued failure to display identification badges as required by this policy may result in the individual being removed from the Project or assessment of fines against the Contractor.

4. Substitution for Specified Items

4.1 Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Contractor may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified.

4.1.1 If the material, process, or article offered by Contractor is not, in the opinion of the District, substantially equal or better in every respect to that specified, then Contractor shall furnish the material, process, or article specified in the Specifications without any additional compensation or change order.

4.1.2 This provision shall not be applicable with respect to any material, product, thing or service for which District made findings and gave notice in accordance with Public Contract Code section 3400(c); therefore, Contractor shall not be entitled to request a substitution with respect to those materials, products or services.

4.2 A request for a substitution shall be submitted as follows:

4.2.1 Contractor shall notify the District in writing of any request for a substitution at least ten (10) days prior to bid opening as indicated in the Instructions to Bidders.

4.2.2 Requests for Substitutions after award of the Contract shall be submitted within thirty-five (35) days of the date of the Notice of Award.

4.3 Within 35 days after the date of the Notice of Award, Contractor shall provide data substantiating a request for substitution of "an equal" item, including but not limited to the following:

4.3.1 All variations of the proposed substitute from the material specified including, but not limited to, principles of operation, materials, or construction finish, thickness or gauge of materials, dimensions, weight, and tolerances;

4.3.2 Available maintenance, repair or replacement services;

4.3.3 Increases or decreases in operating, maintenance, repair, replacement, and spare parts costs;

4.3.4 Whether or not acceptance of the substitute will require other changes in the Work (or in work performed by the District or others under Contract with the District); and

4.3.5 The time impact on any part of the Work resulting directly or indirectly from acceptance of the proposed substitute.

4.4 No substitutions shall be made until approved, in writing, by the District. The burden of proof as to equality of any material, process, or article shall rest with Contractor. The Contractor warrants that if substitutes are approved:

4.4.1 The proposed substitute is equal or superior in all respects to that specified, and that such proposed substitute is suitable and fit for the intended purpose and will perform adequately the function and achieve the results called for by the general design and the Contract Documents;

4.4.2 The Contractor provides the same warranties and guarantees for the substitute that would be provided for that specified;

4.4.3 The Contractor shall be fully responsible for the installation of the substitute and any changes in the Work required, either directly or indirectly, because of the acceptance of such substitute, with no increase in Contract Price or Contract Time. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time;

4.4.4 The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute; and

4.4.5 The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit.

4.5 In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

4.6 In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

4.7 Contractor shall be responsible for any costs the District incurs for professional services, DSA fees, or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods. District may deduct those costs from any amounts owing to the Contractor for the review of the request for substitution, even if the request for substitution is not approved. District, at its sole discretion, shall deduct from the payments due to and/or invoice Contractor for all the professional services and/or DSA fees or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods arising herein.

5. Weather Days

Delays due to Adverse Weather conditions will only be permitted in compliance with the provisions in the General Conditions and only if the number of days of Adverse Weather exceeds the following parameters and Contractor can verify that the excess days of Adverse Weather caused delays:

January		July	
February		August	
March		September	
April		October	
May		November	
June		December	

6. Owner-Controlled or Wrap-Up Insurance Program

Contractor and all Subcontractors under the Contractor shall participate in and comply with the owner-controlled or wrap-up insurance program ("OCIP") as required by the District, OCIP Administrator, insurers, or designees, prior to the commencement of construction activities at the Project. In addition, Contractor shall procure and maintain, at its own expense, until completion and final acceptance of the Work at least the following insurance from insurance companies with an A.M. Best rating of no less than _____, except for those coverages provided by the OCIP as described in the OCIP Manual:

[Commercial General Liability]	Personal Injury Liability, Broad Form Property Damage including completed operations, and Explosion, Collapse and Underground Hazards	[E.G. \$5,000,000]
[Automobile Liability – Any Auto]	Bodily Injury and Property Damage	[E.G. \$5,000,000]
[Workers Compensation]		Statutory limits pursuant to State law
[Employers' Liability]		[E.G. \$1,000,000]

7. Insurance Policy Limits

All of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than _____. The limits of insurance shall not be less than:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	[E.G.] Low Risk: \$1,000,000 per occurrence; \$2,000,000 aggregate
		Intermediate Risk: \$2,000,000 per occurrence; \$4,000,000 aggregate
		High Risk: \$5,000,000 per occurrence; \$10,000,000 aggregate]
Automobile Liability – Any Auto	Combined Single Limit	[E.G.] Personal vehicles: \$500,000 Commercial vehicles: \$1,000,000

		Personal vehicles: \$100,000 per person/ \$300,000 per accident]
Workers' Compensation		Statutory limits pursuant to State law
Employers' Liability		[E.G. \$0]
Builder's Risk (Course of Construction)		Issued for the value and scope of Work indicated herein.
Pollution Liability		[E.G. \$0]

8. Permits, Certificates, Licenses, Fees, Approvals

8.1 Payment for Permits, Certificates, Licenses, Fees, and Approvals. As required in the General Conditions, the Contractor shall secure and pay for all permits, licenses, approvals, and certificates necessary for the prosecution of the Work with the exception of the following:

8.1.1

With respect to the above-listed items, Contractor shall be responsible for securing such items; however, District will be responsible for payment of these charges or fees. Contractor shall notify the District of the amount due with respect to such items and to whom the amount is payable. Contractor shall provide the District with an invoice and receipt with respect to such charges or fees.

8.2 General Permit For Storm Water Discharges Associated With Construction and Land Disturbance Activities

8.2.1 Contractor acknowledges that all California school districts are obligated to develop and implement the following requirements for the discharge of storm water to surface waters from its construction and land disturbance activities (storm water requirements):

8.2.1.1 Projects that disturb less than one acre of land and are not part of a larger common plan of development or sale, in accordance with Title 24, Chapter 5.106.1, shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:

8.2.1.1.1 Comply with lawfully enacted stormwater management and/or erosion control ordinance.

8.2.1.1.2 Prevent loss of soil through wind or water erosion by adhering to a Storm Water Pollution Prevention Plan ("SWPPP") implementing an effective combination of erosion and sediment control and good housekeeping best management practices ("BMPs").

8.2.1.1.2.1 Soil loss BMP's that should be considered for implementation as appropriate for each project include, but are not limited to, the following:

8.2.1.1.2.1.1 Scheduling construction activity during dry weather, when possible.

8.2.1.1.2.1.2 Preservation of natural features, vegetation, soil, and buffers around surface waters.

8.2.1.1.2.1.3 Drainage swales or lined ditches to control stormwater flow.

8.2.1.1.2.1.4 Mulching or hydroseeding to stabilize disturbed soils.

8.2.1.1.2.1.5 Erosion control to protect slopes.

8.2.1.1.2.1.6 Protection of storm drain inlets (gravel bags or catch basin inserts).

8.2.1.1.2.1.7 Perimeter sediment control (perimeter silt fence, fiber rolls).

8.2.1.1.2.1.8 Sediment trap or sediment basin to retain sediment on site.

8.2.1.1.2.1.9 Stabilized construction exits.

8.2.1.1.2.1.10 Wind erosion control.

8.2.1.1.2.1.11 Other soil loss BMP's acceptable to the enforcing agency.

8.2.1.1.2.2 Good housekeeping BMP's to manage construction equipment, materials, non-stormwater discharges, and wastes that should be considered for implementation as appropriate for each project include, but are not limited to, the following:

8.2.1.1.2.2.1 Dewatering activities.

8.2.1.1.2.2.2 Material handling and waste management.

8.2.1.1.2.2.3 Building materials stockpile management.

8.2.1.1.2.2.4 Management of washout areas (concrete, paints, stucco, etc.).

8.2.1.1.2.2.5 Control of vehicle/equipment fueling to contractor's staging area.

8.2.1.1.2.2.6 Vehicle and equipment cleaning performed off site.

8.2.1.1.2.2.7 Spill prevention and control.

8.2.1.1.2.2.8 Other housekeeping BMP's acceptable to the enforcing agency.

8.2.1.2 Projects that disturb one acre or more of land, or disturb less than one acre of land but are part of a larger common plan of development or sale shall comply with all lawfully enacted stormwater discharge regulations in accordance with Title 24, Chapter 5.106.2.

8.2.2 Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

8.2.3 At no additional cost to the District, Contractor shall provide a Qualified Storm Water Practitioner who shall be onsite and implement and monitor any and all SWPPP requirements applicable to the Project, including but not limited to:

8.2.3.1 At least forty eight (48) hours prior to a forecasted rain event, implementing the Rain Event Action Plan (REAP) for any rain event requiring implementation of the REAP, including any erosion and sediment control measures needed to protect all exposed portions of the site; and

8.2.3.2 Monitoring any Numeric Action Levels (NALs), if applicable.

9. Project Labor Agreement/Payroll Records

The District has entered into a Project Labor Agreement ("PLA"), which covers this Project. Accordingly, the following provision is added as Section 26.4.6:

26.4.6 As Contractor and its subcontractors have agreed to be bound by the terms of the PLA entered into by the District [on or about / dated] _____, Contractor and its subcontractors may be excused from uploading CPRs electronically using DIR's eCPR System by uploading the CPRs by electronic XML file or entering each record manually using the DIR's iform (or current form) online at <http://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html> , or by using a more current application and URL. However, within ten (10) days of any request by the District or Labor Commissioner, Contractor and its subcontractors shall provide CPRs showing the name, address, social security number, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each subcontractor in connection with the Work.

10. As-Builts and Record Drawings

10.1 When called for by Division 1, Contractor shall submit As-Built Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and

drafting ("CADD") files in the following format _____, plus one set of As Built Drawings on vellum or mylar.

10.2 Contractor shall submit Record Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD") files in the following format _____, plus one set of Record Drawings on vellum or mylar.

11. Disabled Veteran Business Enterprise

Pursuant to Education Code section 71028 and Public Contract Code section 10115, the District has a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended each year on District projects. Therefore, the lowest responsive responsible bidder awarded the Contract must submit the Disabled Veteran Business Enterprise Participation Certification to the District with its executed Agreement, identifying the steps contractor took to solicit DVBE participation in conjunction with this Contract.

12. Construction Manager

The District will use a Construction Manager on the Project that is the subject of this Contract. _____ is the Construction Manager for this Project.

13. Program Manager

_____ is the Program Manager designated for the Project that is the subject of this Contract.

14. Federal Funds

As this Project is funded in whole or in part by federal funds, Contractor and all Subcontractors are subject to civil or criminal prosecution for any violation of the federal False Claims Act set forth under section 1001 of title 18 and section 231 of title 31 of the United States Code.

The following provisions are added as Section 27:

27. FEDERAL LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS

27.1 Minimum Wages

The Davis-Bacon Act and 29 CFR parts 1 through 7 shall apply if the Project is financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution.

27.1.1 All laborers and mechanics employed or working upon the Site of the Work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the Project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account, except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3) , the full amount of wages and bona fide fringe benefits, or cash equivalents thereof, due at time of

payment computed at rates not less than those contained in the applicable wage determination of the Secretary of Labor regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of this section, including but not limited to paragraph 27.1.7; also, regular contributions made or costs incurred for more than a weekly period, but not less often than quarterly, under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of Work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing Work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which Work is performed. The wage determination including any additional classification and wage rates conformed under this section, including but not limited to paragraph 27.1.6 and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its Subcontractors at the Site of the Work in a prominent and accessible place where it can be easily seen by the workers.

27.1.2 Any class of laborers or mechanics, including helpers, and which is to be employed under the Contract which is not listed in the wage determination shall be classified in conformance with the wage determination. An additional classification and wage rate and fringe benefits will not be approved unless when the following criteria have been met:

27.1.2.1 The Work to be performed by the classification requested is not performed by a classification in the wage determination; and

27.1.2.2 The classification is utilized in the area by the construction industry; and

27.1.2.3 The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

27.1.3 If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the District agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contractor to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210.

27.1.4 In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the District do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contractor shall provide the questions, including the views of all interested parties and the recommendation of the District, to the District for the District's review and referral to the Administrator for determination.

27.1.5 The wage rate (including fringe benefits where appropriate) determined pursuant to this section, shall be paid to all workers performing Work in the classification under this Contract from the first day on which Work is performed in the classification.

27.1.6 Whenever the minimum wage rate prescribed in any applicable wage determination for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

27.1.7 If the Contractor does not make payments to a trustee or other third person, the Contractor may consider, as part of the wages of any laborer or mechanic, the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. If the Secretary of Labor so requires, the Contractor shall set aside in a separate account sufficient assets to meet obligations under the plan or program.

27.2 Withholding. District may, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same Contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any Subcontractor the full amount of wages required by the Contract. In the event of Contractor's or any Subcontractors' failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the Site of the Work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the Contract, the District may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as it deems necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

27.3 Payrolls and basic records.

27.3.1 Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the Work and preserved for a period of three years thereafter for all laborers and mechanics working at the Site of the Work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is

enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

27.3.2 The Contractor shall submit weekly for each week in which any Contract Work is performed a copy of all payrolls to the District. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information shall be submitted on a form acceptable to the District. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/whd/programs/dbra/wh347.htm> or its successor site. Contractor is responsible for the submission of copies of payrolls by all Subcontractors. Contractor and Subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the District, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. Contractor may require a Subcontractor to provide addresses and social security numbers to the Contractor for its own records, without weekly submission to the District or other government agency

27.3.3 Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or Subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

27.3.3.1 That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5,

27.3.3.2 That the appropriate information is being maintained under 29 CFR 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and

27.3.3.3 That such information is correct and complete;

27.3.3.4 That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and

27.3.3.5 That no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

27.3.3.6 That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification

of Work performed, as specified in the applicable wage determination incorporated into or applicable to the Contract.

27.3.3.7 The weekly submission of a properly executed certification in the form set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 27.3.3 of this section.

27.3.3.8 The falsification of any of the above certifications may subject the Contractor or one or more Subcontractors to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

27.3.3.9 The Contractor or Subcontractor shall make the records required under this section available for inspection, copying, or transcription by authorized representatives of the District or the federal Department of Labor, and shall permit representatives to interview employees during working hours on the job. If the Contractor or Subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

27.4 Apprentices and trainees

27.4.1 Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the Work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first ninety (90) days of probationary employment as an apprentice in an eligible apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job Site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of Work actually performed. In addition, any apprentice performing Work on the job Site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the Work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or Subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not

specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the Work performed until an acceptable program is approved.

27.4.2 Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to Work at less than the predetermined rate for the Work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job Site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of Work actually performed. In addition, any trainee performing Work on the job Site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the Work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the Work performed until an acceptable program is approved.

27.4.3 Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

27.5 Compliance with Copeland Act requirements. Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this Contract.

27.6 Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal agency may by appropriate instructions require, and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for the compliance by any Subcontractor or lower tier Subcontractor with all the Contract clauses in 29 CFR 5.5.

27.7 Contract termination: debarment. A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a Contractor and a Subcontractor as provided in 29 CFR 5.12.

27.8 Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this Contract.

27.9 Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its Subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

27.10 Certification of eligibility.

27.10.1 By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

27.10.2 No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

27.10.3 Contractor shall be subject to the penalty for making false statements prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

27.11 Clauses Mandated by Contract Work Hours and Safety Standards Act.

As used in the following paragraphs, the terms laborers and mechanics include watchmen and guards.

27.11.1 Overtime requirements. No Contractor or Subcontractor contracting for any part of the Contract Work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such Work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

27.11.2 Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in the foregoing paragraph the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the foregoing paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to Work in excess of

the standard workweek of forty hours without payment of the overtime wages required by the foregoing paragraph.

27.11.3 Withholding for unpaid wages and liquidated damages. The District may upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of Work performed by the Contractor or Subcontractor under the Contract or any other Federal contract with the same Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the foregoing paragraph.

27.11.4 Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the foregoing paragraphs concerning "Overtime requirements" and "Violation; liability for unpaid wages; liquidated damages" and also a clause requiring each Subcontractor to include these clauses in any lower tier subcontracts. Contractor shall be responsible for compliance by any Subcontractor or lower tier Subcontractor with the clauses set forth in paragraphs 27.11.1 through 27.11.4 of this section.

15. Preliminary Schedule of Values

The preliminary schedule of values shall include, at a minimum, the following information and the following structure:

Replace provision in the General Conditions with the following provisions:

15.1.1.2.3. The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

15.1.1.2.3.1 Mobilization and layout combined to equal not more than **[1]**%;

15.1.1.2.3.2 Submittals, samples and shop drawings combined to equal not more than **[3]**%;

15.1.1.2.3.3 Bonds and insurance combined to equal not more than **[2]**%.

END OF DOCUMENT

DOCUMENT 00 73 56

**HAZARDOUS MATERIALS
PROCEDURES & REQUIREMENTS**

1. Summary

This document includes information applicable to hazardous materials and hazardous waste abatement.

2. Notice of Hazardous Waste or Materials

- a. Contractor shall give notice in writing to the District, the Construction Manager, and the Architect promptly, before any of the following materials are disturbed, and in no event later than twenty-four (24) hours after first observance, of any:
 - (1) Material that Contractor believes may be a material that is hazardous waste or hazardous material, as defined in section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law;
 - (2) Other material that may present a substantial danger to persons or property exposed thereto in connection with Work at the site.
- b. Contractor's written notice shall indicate whether the hazardous waste or material was shown or indicated in the Contract Documents to be within the scope of Work, and whether the materials were brought to the site by Contractor, its Subcontractors, suppliers, or anyone else for whom Contractor is responsible. As used in this section the term "hazardous materials" shall include, without limitation, asbestos, lead, Polychlorinated biphenyl (PCB), petroleum and related hydrocarbons, and radioactive material.
- c. In response to Contractor's written notice, the District shall investigate the identified conditions.
- d. If the District determines that conditions do not involve hazardous materials or that no change in terms of Contract is justified, the District shall so notify Contractor in writing, stating reasons. If the District and Contractor cannot agree on whether conditions justify an adjustment in Contract Price or Contract Time, or on the extent of any adjustment, Contractor shall proceed with the Work as directed by the District.
- e. If after receipt of notice from the District, Contractor does not agree to resume Work based on a reasonable belief it is unsafe, or does not agree to resume Work under special conditions, then District may order such portion of Work that is in connection with such hazardous condition or such affected area to be deleted from the Work, or performed by others, or District may invoke its rights to terminate the Contract in whole or in part. District will determine entitlement to or the amount or extent of an adjustment, if any, in

Contract Price or Contract Time as a result of deleting such portion of Work, or performing the Work by others.

- f. If Contractor stops Work in connection with any hazardous condition and in any area affected thereby, Contractor shall immediately redeploy its workers, equipment, and materials, as necessary, to other portions of the Work to minimize delay and disruption.

3. Additional Warranties and Representations

- a. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have the required levels of familiarity with the Site and the Work, training, and ability to comply fully with all applicable laws and contractual requirements for safe and expeditious performance of the Work, including whatever training is or may be required regarding the activities to be performed (including, but not limited to, all training required to address adequately the actual or potential dangers of Contract performance).
- b. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have and maintain in good standing any and all certifications and licenses required by applicable federal, state, and other governmental and quasi-governmental requirements applicable to the Work.
- c. Contractor represents and warrants that it has studied carefully all requirements of the Specifications regarding procedures for demolition, hazardous waste abatement, or safety practices, specified in the Contract, and prior to submitting its bid, has either (a) verified to its satisfaction that the specified procedures are adequate and sufficient to achieve the results intended by the Contract Documents, or (b) by way of approved "or equal" request or request for clarification and written Addenda, secured changes to the specified procedures sufficient to achieve the results intended by the Contract Documents. Contractor accepts the risk that any specified procedure will result in a completed Project in full compliance with the Contract Documents.

4. Monitoring and Testing

- a. District reserves the right, in its sole discretion, to conduct air monitoring, earth monitoring, Work monitoring, and any other tests (in addition to testing required under the agreement or applicable law), to monitor Contract requirements of safe and statutorily compliant work methods and (where applicable) safe re-entry level air standards under state and federal law upon completion of the job, and compliance of the work with periodic and final inspection by public and quasi-public entities having jurisdiction.
- b. Contractor acknowledges that District has the right to perform, or cause to be performed, various activities and tests including, but not limited to, pre-abatement, during abatement, and post-abatement air monitoring, that District shall have no obligation to perform said activities and tests, and that a portion of said activities and tests may take place prior to the completion of

the Work by Contractor. In the event District elects to perform these activities and tests, Contractor shall afford District ample access to the Site and all areas of the Work as may be necessary for the performance of these activities and tests. Contractor will include the potential impact of these activities or tests by District in the Contract Price and the Scheduled Completion Date.

- c. Notwithstanding District's rights granted by this paragraph, Contractor may retain its own industrial hygiene consultant at Contractor's own expense and may collect samples and may perform tests including, but not limited to, pre-abatement, during abatement, and post-abatement personal air monitoring, and District reserves the right to request documentation of all such activities and tests performed by Contractor relating to the Work and Contractor shall immediately provide that documentation upon request.

5. Compliance with Laws

- a. Contractor shall perform safe, expeditious, and orderly work in accordance with the best practices and the highest standards in the hazardous waste abatement, removal, and disposal industry, the applicable law, and the Contract Documents, including, but not limited to, all responsibilities relating to the preparation and return of waste shipment records, all requirements of the law, delivering of all requisite notices, and obtaining all necessary governmental and quasi-governmental approvals.
- b. Contractor represents that it is familiar with and shall comply with all laws applicable to the Work or completed Work including, but not limited to, all federal, state, and local laws, statutes, standards, rules, regulations, and ordinances applicable to the Work relating to:
 - (1) The protection of the public health, welfare and environment;
 - (2) Storage, handling, or use of asbestos, PCB, lead, petroleum based products, radioactive material, or other hazardous materials;
 - (3) The generation, processing, treatment, storage, transport, disposal, destruction, or other management of asbestos, PCB, lead, petroleum, radioactive material, or hazardous waste materials or other waste materials of any kind; and
 - (4) The protection of environmentally sensitive areas such as wetlands and coastal areas.

6. Disposal

- a. Contractor has the sole responsibility for determining current waste storage, handling, transportation, and disposal regulations for the job Site and for each waste disposal facility. Contractor must comply fully at its sole cost and expense with these regulations and any applicable law. District may, but is not obligated to, require submittals with this information for it to review consistent with the Contract Documents.

- b. Contractor shall develop and implement a system acceptable to District to track hazardous waste from the Site to disposal, including appropriate "Hazardous Waste Manifests" on the EPA form, so that District may track the volume of waste it put in each landfill and receive from each landfill a certificate of receipt.
- c. Contractor shall provide District with the name and address of each waste disposal facility prior to any disposal, and District shall have the express right to reject any proposed disposal facility. Contractor shall not use any disposal facility to which District has objected. Contractor shall document actual disposal or destruction of waste at a designated facility by completing a disposal certificate or certificate of destruction forwarding the original to the District.

7. Permits

- a. Before performing any of the Work, and at such other times as may be required by applicable law, Contractor shall deliver all requisite notices and obtain the approval of all governmental and quasi-governmental authorities having jurisdiction over the Work. Contractor shall submit evidence satisfactory to District that it and any disposal facility:
 - (1) have obtained all required permits, approvals, and the like in a timely manner both prior to commencement of the Work and thereafter as and when required by applicable law; and
 - (2) are in compliance with all such permits, approvals and the regulations.

For example, before commencing any work in connection with the Work involving asbestos-containing materials, or PCBs, or other hazardous materials subject to regulation, Contractor agrees to provide the required notice of intent to renovate or demolish to the appropriate state or federal agency having jurisdiction, by certified mail, return receipt requested, or by some other method of transmittal for which a return receipt is obtained, and to send a copy of that notice to District. Contractor shall not conduct any Work involving asbestos-containing materials or PCBs unless Contractor has first confirmed that the appropriate agency having jurisdiction is in receipt of the required notification. All permits, licenses, and bonds that are required by governmental or quasi-governmental authorities, and all fees, deposits, tap fees, offsite easements, and asbestos and PCB disposal facilities expenses necessary for the prosecution of the Work, shall be procured and paid for by Contractor. Contractor shall give all notices and comply with the all applicable laws bearing on the conduct of the Work as drawn and specified. If Contractor observes or reasonably should have observed that Plans and Specifications and other Contract Documents are at variance therewith, it shall be responsible for promptly notifying District in writing of such fact. If Contractor performs any Work contrary to applicable laws, it shall bear all costs arising therefrom.

- b. In the case of any permits or notices held in District's name or of necessity to be made in District's name, District shall cooperate with Contractor in securing the permit or giving the notice, but the Contractor shall prepare for District review and execution upon approval, all necessary applications, notices, and other materials.

8. Indemnification

To the fullest extent permitted by law, the indemnities and limitations of liability expressed throughout the Contract Documents apply with equal force and effect to any claims or liabilities imposed or existing by virtue of the removal, abatement, and disposal of hazardous waste. This includes, but is not limited to, liabilities connected to the selection and use of a waste disposal facility, a waste transporter, personal injury, property damage, loss of use of property, damage to the environment or natural resources, or "disposal" and "release" of materials associated with the Work (as defined in 42 U.S.C. § 9601 *et seq.*).

9. Termination

District shall have an absolute right to terminate for default immediately without notice and without an opportunity to cure should Contractor knowingly or recklessly commit a material breach of the terms of the Contract Documents, or any applicable law, on any matter involving the exposure of persons or property to hazardous waste. However, if the breach of contract exposing persons or property to hazardous waste is due solely to an ordinary, unintentional, and non-reckless failure to exercise reasonable care, then the procedures for termination for cause shall apply without modification.

END OF DOCUMENT

SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access Conditions and Requirements;
- B. Special Conditions.

1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of this Contract consists of the following:

Selective demolition and construction necessary for the Modernization to existing school buildings, including associated civil, architectural, structural, plumbing, mechanical and/or electrical work as indicated in the Drawings and Specifications. Generally, these categories of work involve new finishes, adaptive re-use and modification of certain selected areas, new cabinetry, handicap accessibility retrofits, re-roofing, and adding HVAC to instructional areas, library and administrative areas and pertain to changing and expanding selected infrastructure utilities, and extensive modifications. The Project will involve the "phasing" and barricading of work areas as indicated on the Plans and enumerated in these Specifications.

1.03 CONTRACTS

- A. Perform the Work under a single, fixed-price Contract.

1.04 WORK BY OTHERS

- A. Work on the Project that will be performed and completed prior to the start of the Work of this Contract:
 - (1) Asbestos removal/abatement.
 - (2) Lead paint removal/abatement.
- B. Work on the Project that will be performed by others concurrent with the Work of this Contract:
 - (1) _____
 - (2) _____

1.05 CODES, REGULATIONS, AND STANDARDS

- A. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this Project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.
- B. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

1.06 PROJECT RECORD DOCUMENTS

- A. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:
 - (1) Contract Drawings.
 - (2) Specifications.
 - (3) Addenda.
 - (4) Change Orders and other modifications to the Contract.
 - (5) Reviewed shop drawings, product data, and samples.
 - (6) Field test records.
 - (7) Inspection certificates.
 - (8) Manufacturer's certificates.
- B. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.
- C. Contractor shall record information concurrent with construction progress.
- D. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) installed, including the following:
 - (1) Manufacturer's name and product model and number.
 - (2) Product substitutions or alternates utilized.
 - (3) Changes made by Addenda and Change Orders and written directives.

1.07 EXAMINATION OF EXISTING CONDITIONS

- A. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site and of the streets or roads approaching the Site.

- B. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.
- C. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

1.08 CONTRACTOR'S USE OF PREMISES

- A. If unoccupied and only with District's prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.
- B. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor.
- C. Contractor shall not interfere with use of or access to occupied portions of the building(s) or adjacent property.
- D. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.
- E. No one other than those directly involved in the demolition and construction, or specifically designated by the District or the Architect shall be permitted in the areas of work during demolition and construction activities.
- F. The Contractor shall install the construction fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

1.09 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.
- B. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

1.10 UTILITY SHUTDOWNS AND INTERRUPTIONS

- A. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. The District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.
- B. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

1.11 STRUCTURAL INTEGRITY

- A. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.
- B. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

ALLOWANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-specified work.

1.2 RELATED SECTIONS

A. Document 01 10 00 (Summary of Work)

B. Document 01 29 00 (Payments and Completion)

C. Document 01 32 19 (Submittal Procedures)

1.3 ALLOWANCES

- A. Included in the Contract, a stipulated sum/price of **[INSERT AMOUNT]** as an allowance for Unforeseen Conditions within the limits set forth in the Contract Documents. This Allowance shall not be utilized without written approval by the District.
- B. Contractor's costs, without overhead and profit, for products, delivery, installation, labor, insurance, payroll, taxes, bonding and equipment rental will be included in Allowance Expenditure Directive authorizing expenditure of funds from this Allowance. No overhead and profit shall be added to the Allowance Expenditure Directive.
- C. Funds will be drawn from Allowance only with District approval evidenced by an Allowance Expenditure Directive.
- D. At Contract closeout, funds remaining in Allowance will be credited to District by Change Order.
- E. Whenever costs are more than the Allowance, the amount covered by the Allowance will be approved at cost. The Contract Price shall be adjusted by Change Order for amounts in excess of the Allowance.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF DOCUMENT

ALTERNATES AND UNIT PRICING

PART 1 – ALTERNATES

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A.** General Conditions;
- B.** Special Conditions;
- C.** Bid Form and Proposal;
- D.** Instruction to Bidders.

1.02 DESCRIPTION

The items of work indicated below propose modifications to, substitutions for, additions to and/or deletions from the various parts of the Work specified in other Sections of the Specifications. The acceptance or rejection of any of the alternates is strictly at the option of the District subject to District's acceptance of Contractor's stated prices contained in this Proposal.

1.03 GENERAL

Where an item is omitted, or scope of Work is decreased, all Work pertaining to the item whether specifically stated or not, shall be omitted and where an items is added or modified or where scope of Work is increased, all Work pertaining to that required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

1.04 BASE BID

The Base Bid includes all work required to construct the Project completely and in accordance with the Contract Documents.

1.05 ALTERNATES

- A.**
- B.**

The above Alternate descriptions are general in nature and for reference purposes only. The Contract Documents, including, without limitation, the Drawings and Specifications, must be referred to for the complete scope of Work.

PART 2 - UNIT PRICING

2.01 GENERAL

Contractor shall completely state all required figures based on Unit Prices listed below. Where scope of Work is decreased, all Work pertaining to the item, whether specifically stated or not, shall be omitted and where scope of Work is increased, all work pertaining to that item required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

2.02 UNIT PRICES

Furnish unit prices for each of the named items on a square foot, lineal foot, or per each basis, as applies. Unit prices shall include all labor, materials, services, profit, overhead, insurance, bonds, taxes, and all other incidental costs of Contractor, subcontractors, and supplier(s).

A.

B.

END OF DOCUMENT

DOCUMENT 01 25 13
PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. Instructions to Bidders;
- B. General Conditions, including, without limitation, Substitutions For Specified Items; and
- C. Special Conditions.

1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

- A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.
- B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.
- C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions. The District's Board has found and determined that certain item(s) shall be used on this Project based on the purpose(s) indicated pursuant to Public Contract Code section 3400(c). These findings, as well as the products and brand or trade names, have been identified in the Notice to Bidders.
- D. The Contractor will not be allowed to substitute specified items unless the request for substitution is submitted as follows:
 - (1) District must receive any notice of request for substitution of a specified item a minimum of ten (10) calendar days prior to bid opening.

- (2) Within 35 days after the date of the Notice of Award, the Contractor shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the technical Specifications. Insufficient information shall be grounds for rejection of substitution.
- E. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.
- F. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.
- G. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute.
- H. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit. In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.
- I. In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 26 00

CHANGES IN THE WORK

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS IN THE AGREEMENT, GENERAL CONDITIONS, AND SPECIAL CONDITIONS, IF USED, RELATED TO CHANGES AND/OR REQUESTS FOR CHANGES.

END OF DOCUMENT

DOCUMENT 01 29 00

**APPLICATION FOR PAYMENT AND
CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS**

**CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS IN THE GENERAL
CONDITIONS RELATED TO APPLICATIONS FOR PAYMENT AND/OR PAYMENTS.**

**CONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8132)**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: \$_____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

Amount(s) of unpaid progress payment(s): \$_____

- (4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**UNCONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8134)**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: \$_____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**CONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8136)**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check:

Amount of Check: \$ _____

Check Payable to: _____

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: \$ _____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**UNCONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8138)**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: \$_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

PROJECT MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions; and
- B. Special Conditions.

1.02 PROGRESS MEETINGS:

- A. Contractor shall schedule and hold regular weekly progress meetings after a minimum of one week's prior written notice of the meeting date and time to all Invitees as indicated below.

Location: Online conference software or Contractor's field office

- B. The Contractor shall notify and invite the following entities ("Invitees"):
 - (1) District Representative.
 - (2) Contractor.
 - (3) Contractor's Project Manager.
 - (4) Contractor's Superintendent.
 - (5) Subcontractors, as appropriate to the agenda of the meeting.
 - (6) Suppliers, as appropriate to the agenda of the meeting.
 - (7) Construction Manager, if any.
 - (8) Architect
 - (9) Engineer(s), if any and as appropriate to the agenda of the meeting.
 - (10) Others, as appropriate to the agenda of the meeting.
- C. The District's, the Architect's, and/or an engineer's Consultants will attend at their discretion, in response to the agenda.
- D. The District representative, the Construction Manager, and/or another District Agent shall take and distribute meeting notes to attendees and other concerned parties. If exceptions are taken to anything in the meeting notes,

those exceptions shall be stated in writing to the District within five (5) working days following District's distribution of the meeting notes.

1.03 PRE-INSTALLATION/PERFORMANCE MEETING:

- A. Contractor shall schedule a meeting prior to the start of each of the following portions of the Work: cutting and patching of plaster and roofing, and other weather-exposed and moisture-resistant products. Contractor shall invite all Invitees to this meeting, and others whose work may affect or be affected by the quality of the cutting and patching work.
- B. Contractor shall review in detail prior to this meeting, the manufacturer's requirements and specifications, applicable portions of the Contract Documents, Shop Drawings, and other submittals, and other related work. At this meeting, invitees shall review and resolve conflicts, incompatibilities, or inadequacies discovered or anticipated.
- C. Contractor shall review in detail Project conditions, schedule, requirements for performance, application, installation, and quality of completed Work, and protection of adjacent Work and property.
- D. Contractor shall review in detail means of protecting the completed Work during the remainder of the construction period.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 32 13

SCHEDULING OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Summary of Work; and
- D. Submittals.

1.02 SECTION INCLUDES

- A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.
 - (1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method ("CPM") scheduling ("CPM Schedule").
 - (2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.
 - (3) Submit schedules and reports as specified in the General Conditions.
- B. Upon Award of Contract, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

1.03 CONSTRUCTION SCHEDULE

- A. Within ten (10) days of issuance of the Notice to Proceed, and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.
- B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.

C. Milestone Schedule:

ACTIVITY DESCRIPTION	REQUIRED COMPLETION
-----------------------------	----------------------------

CONSTRUCTION STARTS	[DATE]
----------------------------	---------------

FINAL PROJECT COMPLETION	[DATE]
---------------------------------	---------------

1.04 QUALIFICATIONS

A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of [i.e., Primavera Project Planner]. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.

- (1) The written statement shall identify the individual who will perform CPM scheduling.
- (2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.
- (3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three fourths ($\frac{3}{4}$) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.

B. District reserves the right to approve or reject Contractor's scheduler or consultant at any time. District reserves the right to refuse replacing of Contractor's scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

1.05 GENERAL

A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.

B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.

- (1) District is not required to accept an early completion schedule, i.e., one that shows an earlier completion date than the Contract Time.
- (2) Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier completion schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.

- (3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.
- C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.
- (1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.
 - (2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.
- D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.
- E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.
- F. Software: Use **[i.e., District Project Planner for Windows, latest version]**. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.
- G. Transmit each item under the form approved by District.
- (1) Identify Project with District Contract number and name of Contractor.
 - (2) Provide space for Contractor's approval stamp and District's review stamps.
 - (3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

1.06 INITIAL CPM SCHEDULE

- A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.
- B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment; sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.
- C. Initial CPM Schedule shall be time scaled.
- D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.
- E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.
 - (1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).
 - (2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.
- F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Evaluation ("TIE") in accordance with Article 1.12 of this Section. The TIE shall be based on the most current update of the Initial CPM Schedule.

1.07 ORIGINAL CPM SCHEDULE

- A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.
- B. Progress Schedule shall include or comply with following requirements:
 - (1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.
 - (2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.

- (a) Activity durations shall be total number of actual work days required to perform that activity.
- (3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.
- (4) District furnished materials and equipment, if any, identified as separate activities.
- (5) Activities for maintaining Project Record Documents.
- (6) Dependencies (or relationships) between activities.
- (7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.
 - (a) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.
 - (b) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.
- (8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.
 - (a) Include time for fabrication and delivery of manufactured products for the Work.
 - (b) Show dependencies between procurement and construction.
- (9) Activity description; what Work is to be accomplished and where.
- (10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit of the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.
- (11) Resources required (labor and major equipment) to perform each activity.
- (12) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.
- (13) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.

- (14) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final clean-up for the Work or any designated portion thereof. No other activities shall be scheduled during this period.
 - (15) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.
 - (16) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.
 - (a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.
 - (b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.
 - (c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.
 - (d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.
 - (17) Activity durations shall be in Work days.
 - (18) Submit with the schedule a list of anticipated non-Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non-Work days on which Contractor anticipates critical Work will not be performed.
- C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.
- (1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.
 - (2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:

- (a) Clarifications of Contract Requirements.
 - (b) Directions to include activities and information missing from submittal.
 - (c) Requests to Contractor to clarify its schedule.
- (3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

1.08 ADJUSTMENTS TO CPM SCHEDULE

- A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.
- (1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:
 - (a) Accept schedule and cost and resource loaded activities as submitted, or
 - (b) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.
 - (2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.
 - (3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.
 - (4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.
- B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.
- (1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.

- (2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.
- (3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed Work.
- C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.
- D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS

- A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.
 - (1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.
 - (2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.
- B. A meeting will be held on approximately the twenty-fifth (25th) of each month to review the schedule update submittal and progress payment application.
 - (1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.
 - (2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.
 - (3) Contractor shall plan on the meeting taking no less than four (4) hours.
- C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.

- D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.
- (1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.
 - (2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.
- E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

1.10 SCHEDULE REVISIONS

- A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.
- B. To reflect revisions to the Schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.
- C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.
- D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.
- E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.11 RECOVERY SCHEDULE

- A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.
- B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.
- C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.
- D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.12 TIME IMPACT EVALUATION ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS

- A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIE which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show how the Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.
- B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.
- C. Contractor shall be responsible for all costs associated with the preparation of TIEs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIE.
- D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

1.13 TIME EXTENSIONS

- A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.
- B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14) calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.
- C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.
- D. No time will be granted under this Contract for cumulative effect of changes.
- E. District will not be obligated to consider any time extension request unless the Contractor complies with the requirements of Contract Documents.
- F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.
- G. If the Contractor does not submit a TIE within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.14 SCHEDULE REPORTS

- A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.
- B. Required Reports:
 - (1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.
 - (2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to date, previous payments, and amount earned for current update period.

- (3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.
- (4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.
- (5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

C. Other Reports:

In addition to above reports, District may request, from month to month, any two of the following reports. Submit four (4) copies of all reports.

- (1) Activities by early start.
- (2) Activities by late start.
- (3) Activities grouped by Subcontractors or selected trades.
- (4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.

D. Furnish District with report files on compact disks containing all schedule files for each report generated.

1.15 PROJECT STATUS REPORTING

- A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.
- B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:
- (1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.
 - (2) Progress made on critical activities indicated on CPM Schedule.
 - (3) Explanations for any lack of work on critical path activities planned to be performed during last month.
 - (4) Explanations for any schedule changes, including changes to logic or to activity durations.
 - (5) List of critical activities scheduled to be performed next month.

- (6) Status of major material and equipment procurement.
- (7) Any delays encountered during reporting period.
- (8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.
 - (a) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.
 - (b) Contractor shall explain all variances and mitigation measures.
- (9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.
- (10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

1.16 WEEKLY SCHEDULE REPORT

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

1.17 DAILY CONSTRUCTION REPORTS

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and man-hours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

- A. Project name and Project number.
- B. Contractor's name and address.
- C. Weather, temperature, and any unusual site conditions.
- D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.
- E. Worker quantities for its own Work force and for Subcontractors of any tier.
- F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.18 PERIODIC VERIFIED REPORTS

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;
- B. Special Conditions.

1.02 SECTION INCLUDES:

- A. Definitions:
 - (1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.
 - (2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.
 - (3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.
- B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:

- (1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.
- (2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.
- (3) Contractor shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.
- (4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.
- (5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and "cuts" shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.
- (6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.
- (7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. Also certify that Contractor-furnished equipment can be installed in allocated space. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Submittals shall not be used as a means of requesting a substitution.
- (8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.
- (9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.

C. Submittal Schedule:

- (1) Contractor shall prepare its proposed submittal schedule that is coordinated with the its proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.
- (2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revise and resubmit", etc.
- (3) All Submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those Submittals shall be forwarded to the District so as not to delay the Construction Schedule.
- (4) Contractor may be assessed \$100 a day for each day it is late in submitting a shop drawing or sample. No extensions of time will be granted to Trade Contractor or any Subcontractor because of its failure to have shop drawings and samples submitted in accordance with the Schedule.

1.03 SHOP DRAWINGS:

- A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.
- B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.
- C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.
- D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.
- E. District shall not review Shop Drawings for quantities of materials or number of items supplied.
- F. District's and/or Architect's review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for dimensions, accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. The District's and/or Architect's review of Shop Drawings is not to be construed as approving departures from Contract Documents.

- G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or utilities having jurisdiction.
- H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.
- I. Submitted drawings and details must bear stamp of approval of Contractor:
 - (1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.
 - (2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked, the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.
- J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.
- K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.
- L. Shop Drawings must clearly delineate the following information:
 - (1) Project name and address.
 - (2) Specification number and description.
 - (3) Architect's name and project number.
 - (4) Shop Drawing title, number, date, and scale.
 - (5) Names of Contractor, Subcontractor(s) and fabricator.
 - (6) Working and erection dimensions.
 - (7) Arrangements and sectional views.

- (8) Necessary details, including complete information for making connections with other Work.
 - (9) Kinds of materials and finishes.
 - (10) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.
- M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.
- (1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.
 - (2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

1.04 PRODUCT DATA OR NON REPRODUCIBLE SUBMITTALS:

- A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contractor must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.
- B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.
- C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.
- D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.

- E. Imported Materials Certification must be submitted at least ten (10) days before material is delivered.

1.05 SAMPLES:

- A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.
- B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.
 - (1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.
 - (2) Samples must show full range of texture, color, and pattern.
- C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.
- D. Samples to be shipped prepaid or hand-delivered to the District.
- E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.
- F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect's completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.
- G. District's and/or Architect's review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.
- H. After a material has been approved, no change in brand or make will be permitted.
- I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.
- J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.
- K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:

- (1) Size: As Specified.
- (2) Furnish catalog numbers and similar data, as requested.

1.06 REVIEW AND RESUBMISSION REQUIREMENTS:

- A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.
- B. One (1) copy of product or materials data will be returned to Contractor with the review status.
- C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.
- D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review. Such resubmittal shall not delay the Work.
- E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.
- F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.
- G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.
- H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.
- I. District's and/or Architect's review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is

responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 35 13.23

SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;
- B. Special Conditions;
- C. Drug-Free Workplace Certification;
- D. Tobacco-Free Environment Certification;
- E. Criminal Background Investigation/Fingerprinting Certification;
- F. Temporary Facilities and Controls.

1.02 REQUIREMENTS OF THE DISTRICT:

- A. Drug-Free Schools and Safety Requirements:
 - (1) All school sites and other District Facilities have been declared "Drug-Free Zones." No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.
 - (2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. Contractor shall post: "Non-Smoking Area" in a highly visible location in each work area, staging area, and parking area. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.
 - (3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.
- B. Language: Profanity or other unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff, volunteers, parents or public will not be allowed.

C. Disturbing the Peace (Noise and Lighting):

- (1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.
- (2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for mobile phones or other handheld communication radios.
- (3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

D. Traffic:

- (1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.
- (2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.
- (3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.
- (4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in softscape areas that could otherwise be damaged.

- E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Obtaining of Permits, Licenses and Registrations and Work to Comply with All Applicable Laws and Regulations;
- B. Special Conditions; and
- C. Quality Control.

1.02 DESCRIPTION:

This section covers the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.03 REQUIREMENTS OF REGULATORY AGENCIES:

- A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction over the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").
 - (1) California Building Standards Administrative Code, Part 1, Title 24, CCR.
 - (2) California Building Code (CBC), Part 2, Title 24, CCR; (International Building Code volumes 1-2 and California Amendments).
 - (3) California Electrical Code (CEC), Part 3, Title 24, CCR; (National Electrical Code and California Amendments).
 - (4) California Mechanical Code (CMC), Part 4, Title 24, CCR; (Uniform Mechanical Code and California Amendments).
 - (5) California Plumbing Code (CPC), Part 5, Title 24, CCR; (Uniform Plumbing Code and California Amendments).

- (6) California Fire Code (CFC), Part 9, Title 24, CCR; (International Fire Code and California Amendments).
 - (7) California Green Building Standards Code (CALGreen), Part 11, Title 24, CCR.
 - (8) California Referenced Standards Code, Part 12, Title 24, CCR.
 - (9) State Fire Marshal Regulations, Public Safety, Title 19, CCR.
 - (10) Partial List of Applicable National Fire Protection Association (NFPA) Standards:
 - (a) NFPA 13 - Automatic Sprinkler System.
 - (b) NFPA 14 - Standpipes Systems.
 - (c) NFPA 17A - Wet Chemical System
 - (d) NFPA 24 - Private Fire Mains.
 - (e) (California Amended) NFPA 72 - National Fire Alarm Codes.
 - (f) NFPA 253 - Critical Radiant Flux of Floor Covering System.
 - (g) NFPA 2001 - Clean Agent Fire Extinguishing Systems.
 - (11) California Division of the State Architect interpretation of Regulations ("DSA IR"), including, without limitation:
 - (a) DSA IR A-6 — Construction Change Document Submittal and Approval Processes.
 - (b) DSA IR A-7 — Project Inspector Certification and Approval.
 - (c) DSA IR A-8 — Project Inspector and Assistant Inspector Duties and Performance.
 - (d) DSA IR A-12 — Assistant Inspector Approval.
 - (12) DSA Procedures ("DSA PR")
 - (a) DSA PR 13-01 – Construction Oversight Process
 - (13) DSA PR 13-02 – Project Certification Process
- B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:

- (1) Test and testing laboratory per Section 4-335. District shall pay for the testing laboratory.
- (2) Special inspections per Section 4-333(c).
- (3) Deferred Approvals per section 4-317(g).
- (4) Verified reports per Sections 4-336 & 4-343(c).
- (5) Duties of the Architect & Engineers shall be per Section 4-333(a) and 4-341.
- (6) Duties of the Contractor shall be per Section 4-343.
- (7) Duties of Project Inspector shall be per Section 4-334.
- (8) Addenda and Construction Change Documents per Section 4-338.

Contractor shall keep and make available all applicable parts of the most current version of Title 24 referred to in the plans and specifications at the Site during construction.

- C. Items of deferred approval shall be clearly marked on the first sheet of the Architect's and/or Engineer's approved Drawings. All items later submitted for approval shall be per Title 24 requirements to the DSA.
- (1) Contractor shall submit the following to Architect for review and endorsement:
 - (a) Product information on proposed material/system supplier.
 - (b) Drawings, specifications, and calculations prepared, signed, and stamped by an architect or engineer licensed in the State of California for that portion of the Work.
 - (c) All other requirements as may be required by DSA.
 - (2) Cost of preparing and submitting documentation per DSA Deferred Approval requirements including required modifications to Drawings and Specifications, whether or not indicated in the Contract Documents, shall be borne by Contractor.
 - (3) Contractor shall not begin fabrication and installation of deferred approval items without first obtaining DSA approval of Drawings and Specifications.
 - (4) Schedule of Work Subject to DSA Deferred Approval: Window wall systems exceeding 10 feet in span.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 42 13

ABBREVIATIONS AND ACRONYMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

1.02 DOCUMENT INCLUDES:

- A. Abbreviations used throughout the Contract Documents.
- B. Review Contract Drawings and Specification for additional abbreviations not included herein.
- C. Reference to a technical society, organization, or body is by abbreviation, as follows:

1.	AA	Aluminum Association
2.	AAMA	Architectural Aluminum Manufacturers Association
3.	AASHTO	American Association of State Highway and Transportation Officials
4.	ABPA	Acoustical and Board Products Association
5.	ACI	American Concrete Institute
6.	AGA	American Gas Association
7.	AGC	Associated General Contractors
8.	AHC	Architectural Hardware Consultant
9.	AHRI	Air Conditioning, Heating, Refrigeration Institute
10.	AI	Asphalt Institute
11.	AIA	American Institute of Architects
12.	AIEE	American Institute of Electrical Engineers
13.	AISC	American Institute of Steel Construction
14.	AISI	American Iron and Steel Institute
15.	AMCA	Air Moving and Conditioning Association
16.	ANSI	American National Standards Institute
17.	APA	American Plywood Association
18.	ARI	Air Conditioning and Refrigeration Institute
19.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
20.	ASSE	American Society of Civil Engineers
21.	ASME	American Society of Mechanical Engineers
22.	ASTM	American Society of Testing and Materials
23.	AWPA	American Wood Protection Association

24.	AWPI	American Wood preservers Institute
25.	AWS	American Welding Society
26.	AWSC	American Welding Society Code
27.	AWI	Architectural Woodwork Institute
28.	AWWA	American Water Works Association
29.	BIA	The Brick Industry Association
30.	CCR	California Code of Regulations
31.	CLFMI	Chain Link Fence Manufacturers Institute
32.	CRA	California Redwood Association
33.	CRSI	Concrete Reinforcing Steel Institute
34.	CS	Commercial Standards
35.	CSI	Construction Specifications Institute
36.	CTI	Cooling Tower Institute
37.	FGMA	Flat Glass Manufacturer's Association
38.	FIA	Factory Insurance Association
39.	FM	Factory Mutual Global
40.	FS/FED SPEC	Federal Specification
41.	FTI	Facing Title Institute
42.	GA	Gypsum Association
43.	IAPMO	International Association of Plumbing and Mechanical Officials
44.	ICC	International Code Council
45.	IEEE	Institute of Electrical and Electronic Engineers
46.	IES	Illumination Engineering Society
47.	LIA	Lead Industries Association
48.	MCAC	Mason Contractors Association of California
49.	MIMA	Mineral Wool Insulation Manufacturers Association
50.	MLMA	Metal Lath Manufacturers Association
51.	MS/MIL SPEC	Military Specifications
52.	NAAMM	National Association of Architectural Metal Manufacturers
53.	NBHA	National Builders Hardware Association
54.	NBFU	National Board of Fire Underwriters
55.	NBS	National Bureau of Standards
56.	NCMA	National Concrete Masonry Association
57.	NCSEA	National Council of Structural Engineers Associations
58.	NEC	National Electrical Code
59.	NEMA	National Electrical Manufacturers Association
60.	NSI	Natural Stone Institute
61.	NTMA	National Terrazzo and Mosaic Association
62.	NWMA	National Woodwork Manufacturer's Association
63.	ORS	Office of Regulatory Services (California)
64.	OSHA	Occupational Safety and Health Act
65.	PCI	Precast Concrete Institute
66.	PCA	Portland Cement Association
67.	PDCA	Painting and Decorating Contractors of America
68.	PDI	Plumbing Drainage Institute
69.	PEI	Porcelain Enamel Institute

70.	PG&E	Pacific Gas & Electric Company
71.	PS	Product Standards
72.	SDI	Steel Door Institute; Steel Deck Institute
73.	SJI	Steel Joist Institute
74.	SSPC	Steel Structures Painting Council
75.	TCNA	Tile Council of North America
76.	TPI	Truss Plate Institute
77.	UBC	Uniform Building Code
78.	UL	Underwriters Laboratories Code
79.	UMC	Uniform Mechanical Code
80.	USDA	United States Department of Agriculture
81.	VI	Vermiculite Institute
82.	WCLIB	West Coast Lumberman's Inspection Bureau
83.	WEUSER	Western Electric Utilities Service Engineering Requirements
84.	WIC	Woodwork Institute of California

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 42 16

DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, Contractor shall comply with requirements of the standard, except when more rigid requirements are specified in the Contract Documents, or are required by applicable codes.
- B. Contractor shall conform to current reference standard publication date in effect on the date of bid opening.
- C. Contractor shall obtain copies of standards unless specifically required not to by the Contract Documents.
- D. Contractor shall maintain a copy of all standards at jobsite during submittals, planning, and progress of the specific Work, until final completion, unless specifically required not to by the Contract Documents.
- E. Should specified reference standards conflict with Contract Documents, Contractor shall request clarification from the District and./or the Architect before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the contractual relationship as indicated in the Contract Documents by mention or inference otherwise in any referenced document.
- G. Governing Codes shall be as shown in the Contract Documents including, without limitation, the Specifications.

END OF DOCUMENT

DOCUMENT 01 42 19
REFERENCES

PART 1 - GENERAL

1.01 1.01 SCHEDULE OF REFERENCES:

The following information is intended only for the general assistance of the Contractor, and the District does not represent that all of the information is current. It is the Contractor's responsibility to verify the correct information for each of the entities listed.

AA	Aluminum Association 1525 Wilson Blvd., Suite 600 Arlington, VA 22209 www.aluminum.org	703/358-2960
AABC	Associated Air Balance Council 1518 K Street, NW, Suite 503 Washington, DC 20005 www.aabchq.com	202/737-0202
AAMA	American Architectural Manufacturers Association 1827 Walden Office Sq., Suite 550 Schaumburg, IL 60173-4268 www.aamanet.org	847/303-5664
AASHTO	American Association of State Highway and Transportation Officials 444 N Capitol St. NW - Suite 249 Washington, DC 20001 www.transportation.org	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 One Davis Drive Research Triangle Park, NC 27709 2215 www.aatcc.org	919/549-8141
ACA	American Coatings Association 1500 Rhode Island Ave., NW Washington DC, 20005 www.paint.org	202/462-6272

ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 www.aci-int.org	248/848-3700
ACPA	American Concrete Pipe Association 8445 Freeport Parkway, Suite 350 Irving, TX 75063-2595 www.concrete-pipe.org	972/506-7216
ADC	Air Diffusion Council 1901 N. Roselle Road, Suite 800 Schaumburg, Illinois 60195 www.flexibleduct.org	847/706-6750
AF&PA	American Forest and Paper Association 1111 Nineteenth Street, NW, Suite 800 Washington, DC 20036 www.afandpa.org	202/463-2700
AGA	American Gas Association 400 North Capitol Street, NW Washington, DC 20001 www.aga.org	202/824-7000
AGC	Associate General Contractors of America 2300 Wilson Blvd., Suite 400 Arlington, VA 22201 www.agc.org	703/548-3118
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067 domensino.com/AHA/default.htm	847/934-8800
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480 www.asphaltinstitute.org	859/288-4960
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006-5292 www.aia.org	202/626-7300
AISC	American Institute of Steel Construction One East Wacker Drive Suite 700 Chicago, IL 60601-1802 www.aisc.org	312.670.2400

AIA	American Insurance Association (formerly the National Board of Fire Underwriters) 2101 L Street, NW, Suite 400 Washington, DC 20037 www.aiadc.org	202/828-7100
AISI	American Iron and Steel Institute 25 Massachusetts Ave., NW, Suite 800 Washington, DC 20001 www.steel.org	202/452.7100
AITC	American Institute of Timber Construction 7012 S. Revere Parkway Suite 140 Centennial, CO 80112 www.aitc-glulam.org	303/792.9559
ALI	Associated Laboratories, Inc. P.O. Box 152837 Dallas, TX 75315 www.assoc-labs.com	214/565-0593
ALSC	American Lumber Standards Committee, Inc. P.O. Box 210 Germantown, MD 20875 www.alsc.org	301/972-1700
AMCA	Air Movement and Control Association International, Inc. 30 W. University Drive Arlington Heights, IL 60004 www.amca.org	847/394-0150
ANLA	American Nursery & Landscape Association 1200 G Street NW, Suite 800 Washington, DC 20005 www.anla.org	202/789-2900
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC, 20036 www.ansi.org	202/293.8020
APA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 www.apawood.org	253/565-6600

APA	Architectural Precast Association 6710 Winkler Road, Suite 8 Fort Myers, Florida 33919 www.archprecast.org	239/454-6989
ARI	Air Conditioning and Refrigeration Institute 4100 N. Fairfax Drive, Suite 200 Arlington, VA 22203 www.lightindustries.com/ARI	703/524-8800
ARMA	Asphalt Roofing Manufacturers Association Public Information Department 750 National Press Building 529 14th Street, NW Washington, DC 20045 www.asphaltroofing.org	202/591-2450
ASA	The Acoustical Society of America ASA Office Manager Suite 1NO1 2 Huntington Quadrangle Melville, NY 11747-4502 http://asa.aip.org	516/576-2360
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 www.asce.org	800/548-2723 703/295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329-2305 www.ashrae.org	800/527-4723 404/636-8400
ASLA	American Society of Landscape Architects 636 Eye Street, NW Washington, DC 20001-3736 www.asla.org	202/898-2444
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016-5990 www.asme.org	800/434-2763
ASPE	American Society of Plumbing Engineers 2980 S River Rd. Des Plaines, IL 60018 http://aspe.org	847/296-0002

ASQ	American Society for Quality P.O. Box 3005 Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue Milwaukee, WI 53203 http://asq.org	800/248-1946 414/272-8575
ASSE	American Society of Sanitary Engineering 901 Canterbury, Suite A Westlake, Ohio 44145 www.asse-plumbing.org	440/835-3040
ASTM	ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959 www.astm.org	610/832-9500
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Suite 210 Falls Church, VA 22046 www.awci.org	703/538-1600
AWPA	American Wood Protection Association P.O. Box 361784 Birmingham, AL 35236-1784 www.awpa.com	205/733-4077
AWPI	American Wood Preservers Institute 2750 Prosperity Ave. Suite 550 Fairfax, VA 22031-4312 www.arcata.com	800/356-AWPI 703/204-0500
AWS	American Welding Society 8669 Doral Boulevard, Suite 130 Doral, Florida 33166 www.aws.org	800/443-9353 305/443-9353
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165-5874 www.awinet.org	571/323-3636
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	800/926-7337 303/794 7711

BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 15th floor New York, NY 10017 www.buildershardware.com	212/297-2122
BIA	The Brick Industry Association 1850 Centennial Park Drive, Suite 301 Reston, VA 20191 www.gobrick.com	703/620-0010
CGA	Compressed Gas Association 14501 George Carter Way, Suite 103 Chantilly VA 20151-2923 www.cganet.com	703/788-2700
CISCA	Ceilings & Interior Systems Construction Association 1010 Jorie Blvd, Suite 30 Oak Brook, IL 60523 www.cisca.org	630/584-1919
CISPI	Cast Iron Soil Pipe Institute 1064 Delaware Avenue SE Atlanta, GA 30316 www.cispi.org	404/622-0073
CLFMI	Chain Link Fence Manufacturers Institute 10015 Old Columbia Road, Suite B-215 Columbia, MD 21046 www.associationsites.com/main-pub.cfm?usr=clfma	410/290-6267
CPA	Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176 www.compositepanel.org	703/724-1128
CPSC	Consumer Product Safety Commission 4330 East West Highway Bethesda, MD 20814 www.cpsc.gov	301/504-7923 800/638-2772
CRA	California Redwood Association 405 Enfrente Drive, Suite 200 Novato, CA 94949 www.calredwood.org	415/382-0662

CRI	Carpet and Rug Institute P.O. Box 2048 Dalton, Georgia 30722-2048 www.carpet-rug.org	706/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173 4758 www.crsi.org	847/517-1200
CSI	The Construction Specifications Institute 110 South Union Street, Suite 100 Alexandria VA 22314 www.csinet.org	800/689-2900
CTIOA	Ceramic Tile Institute of America 12061 Jefferson Blvd. Culver City, CA 90230-6219 www.ctioa.org	310/574-7800
DHI	Door and Hardware Institute (formerly National Builders Hardware Association) 14150 Newbrook Dr. Chantilly, VA 20151 www.dhi.org	703/222-2010
DIPRA	Ductile Iron Pipe Research Association 2000 2nd Avenue, South Suite 429 Birmingham, AL 35233 www.dipra.org	205/402-8700
DOC	U.S. Department of Commerce 1401 Constitution Ave., NW Washington, D.C. 20230 www.commerce.gov	202/482-2000
DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590 www.dot.gov	855/368-4200
EJMA	Expansion Joint Manufacturers Association, Inc. 25 North Broadway Tarrytown, NY 10591 www.ejma.org	914/332-0040

EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 www.epa.gov	202/272-0167
FCICA	Floor Covering Installation Contractors Association 7439 Millwood Drive West Bloomfield, MI 48322 www.fcica.com	248/661-5015 877/TO-FCICA
FM Global	Factory Mutual Insurance Company Amy Daley Global Practice Leader – Education, Public Entities, Health Care FM Global 270 Central Avenue Johnston, RI 02919-4949 www.fmglobal.com	401/275-3000 401/275-3029
FS	General Services Administration (GSA) Index of Federal Specifications, Standards and Commercial Item Descriptions 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 www.gsa.gov	202/619-8925
GA	The Gypsum Association 6525 Belcrest Road, Suite 480 Hyattsville, MD 20782 www.gypsum.org	301/277-8686
GANA	Glass Association of North America 800 SW Jackson St., Suite 1500 Topeka, KS 66612-1200 www.glasswebsite.com	785/271-0208
HMA	Hardwood Manufacturers Association 665 Rodi Road, Suite 305 Pittsburgh, PA 15235 http://hmamembers.org	412/244-0440
HPVA	Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190 www.hpva.org	703/435-2900

IAPMO	International Association of Plumbing and Mechanical Officials (formerly the Western Plumbing Officials Association) 4755 E. Philadelphia St. Ontario, CA 91761 www.iapmo.org	909/472-4100
ICC	International Code Council 500 New Jersey Avenue, NW, 6th Floor Washington, DC 20001 www.iccsafe.org	888/422-7233
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue, 17th Floor New York, NY 10016-5997 www.ieee.org	212/419-7900
IES	Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001 www.ies.org	212/248-5000
ITRK	Intertek Testing Services 3933 US Route 11 Cortland, NY 13045 www.intertek.com	607/753-6711
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850 www.mcaa.org	301/869-5800
MIA	Marble Institute of America 28901 Clemens Rd, Ste 100 Cleveland, OH 44145 www.marble-institute.com	440/250-9222
MMPA (formerly WMMPA)	Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association) 507 First Street Woodland, CA 95695 www.wmmpa.com	530/661-9591 800/550-7889

MSS	Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180-4602 http://mss-hq.org	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Rd. Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.naamm.org	630/942-6591
NAIMA	North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314 www.naima.org	703/684-0084
NAPA	National Asphalt Pavement Association 5100 Forbes Blvd. Lanham, MD USA 20706-4407 www.asphaltpavement.org	888/468-6499 301/731-4748
NCSPA	National Corrugated Steel Pipe Association 14070 Proton Road, Suite 100 LB9 Dallas, TX 75244 www.ncspa.org	972/850-1907
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 www.ncma.org	703/713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 www.nebb.org	301/977-3698
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814 www.necanet.org	301/657-3110
NEMA	National Electrical Manufacturers Association 1300 North 17th Street, Suite 1752 Rosslyn, Virginia 22209 www.nema.org	703/841-3200

NEII	National Elevator Industry, Inc. 1677 County Route 64 P.O. Box 838 Salem, New York 12865-0838 www.neii.org	518/854-3100
NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, Massachusetts USA 02169-7471 www.nfpa.org	617/770-3000
NHLA	National Hardwood Lumber Association PO Box 34518 Memphis, TN 38184 www.nhla.com	901/377-1818
NIA	National Insulation Association 12100 Sunset Hills Road, Suite 330 Reston, VA 20190 www.insulation.org	703/464-6422
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.nrca.net	847/299-9070
NSF	NSF International P.O. Box 130140 789 N. Dixboro Road Ann Arbor, MI 48113-0140, USA www.nsf.org	800/673-6275 734/769-8010
NTMA	National Terrazzo and Mosaic Association PO Box 2605 Fredericksburg, TX 78624 www.ntma.com	800/323-9736
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational Safety & Health Administration 200 Constitution Ave., NW Washington, D.C. 20210 www.osha.gov	800/321-OSHA (6742)

PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 or 500 New Jersey Ave., N.W. 7 th Floor Washington, D.C. 20001 www.cement.org	847/966-6200 202/408-9494
PCI	Precast/Prestressed Concrete Institute 200 W. Adams St. #2100 Chicago, IL 60606 www.pci.org	312/786-0300
PDCA	Painting and Decorating Contractors of America 2316 Millpark Drive, Ste 220 Maryland Heights, MO 63043 www.pdca.com	800/332-PDCA (7322) 314/514-7322
PDI	Plumbing & Drainage Institute 800 Turnpike Street, Suite 300 North Andover, MA 01845 http://pdionline.org	978/557-0720 800/589-8956
PEI	Porcelain Enamel Institute, Inc. P.O. Box 920220 Norcross, GA 30010 www.porcelainenamel.com	770/676-9366
PG&E	Pacific Gas & Electric Company www.pge.com	800/743-5000
PLANET	Professional Landcare Network 950 Herndon Parkway, Suite 450 Herndon, Virginia 20170 www.landcarenetwork.org	703/736-9666 800/395-2522 703/736-9668
RFCI	Resilient Floor Covering Institute 115 Broad Street, Suite 201 La Grange GA 30240 www.rfci.com	706/882-3833
RIS	Redwood Inspection Service 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523 www.redwoodinspection.com	925/935-1499
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021 www.sdi.org	847/458-4647

SDI	Steel Door Institute 30200 Detroit Road Westlake, Ohio 44145 www.steeldoor.org	440/899-0010
SJI	Steel Joist Institute 234 W. Cheves Street Florence, SC 29501 http://steeljoist.org	843/407-4091
SMA	Stucco Manufacturers Association 500 East Yale Loop Irvine, CA 92614 www.stuccomfgassoc.com	949/387.7611
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, Virginia 20151-1219 www.smacna.org	703/803-2980
SPI	SPI: The Plastics Industry Trade Association, Inc. 1667 K St., NW, Suite 1000 Washington, DC 20006 www.plasticsindustry.org	202/974-5200
SSPC	Society for Protective Coatings (formerly the Steel Structures Painting Council) 40 24th St 6th Fl Pittsburgh, PA 15222 www.sspc.org	412/281-2331 877/281-7772
TCA	The Tile Council of North America 100 Clemson Research Blvd. Anderson, SC 29625 www.tcnatile.com	864/646-8453
TPI	Truss Plate Institute 218 North Lee Street, Suite 312 Alexandria, VA 22314 www.tpinst.org	703/683-1010
TPI	Turfgrass Producers International 2 East Main Street East Dundee, IL 60118 www.turfgrassod.org	800/405-8873 847/649-5555

TCIA	Tree Care Industry Association (formerly the National Arborist Association) 136 Harvey Road, Suite 101 Londonderry, NH 03053 www.tcia.org	800/733-2622
TVI	The Vermiculite Institute c/o The Schundler Company 150 Whitman Avenue Edison, NJ. 08817 www.vermiculiteinstitute.org	732/287-2244
UL	Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847/272-8800 877/854-3577
UNI	Uni-Bell PVC Pipe Association 2711 LBJ Freeway, Suite 1000 Dallas, TX 75234 www.uni-bell.org	972/243-3902
USDA	U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 www.usda.gov	202/720-2791
WA	Wallcoverings Association 401 North Michigan Avenue Suite 2200 Chicago, IL 60611 www.wallcoverings.org	312/321-5166

WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97281 or 6980 S.W. Varns Tigard, OR 97223 www.wclib.org	503/639-0651
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue 15th Floor New York, New York 10017 www.wcmanet.org	212/297-2122
WDMA	Window & Door Manufacturers Association 401 N. Michigan Avenue, Suite 2200 Chicago, IL 60611 or 2025 M Street, NW, Ste. 800 Washington, D.C. 20036-3309 www.wdma.com	312/321-6802 202/367-1157
WI	Woodwork Institute P.O. Box 980247 West Sacramento, CA 95798 www.wicnet.org	916/372-9943
WRI	Wire Reinforcement Institute 942 Main Street Hartford, CT 06103 www.wirereinforcementinstitute.org	860/240-9545
WWCA	Western Wall & Ceiling Contractors Association 1910 N. Lime St. Orange, California 92865 www.wwcca.org	714/221-5520
WWPA	Western Wood Products Association 522 SW Fifth Ave., Suite 500 Portland, OR 97204-2122 www2.wwpa.org	503/224-3930

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 43 00

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Purchase of Materials and Equipment;
- B. Special Conditions;
- C. Imported Materials Certification.

1.02 MATERIAL AND EQUIPMENT

- A. Only items approved by the District and/or Architect shall be used.
- B. Contractor shall submit lists of products and other product information in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

1.03 MATERIAL AND EQUIPMENT COLORS

- A. The District and/or Architect will provide a schedule of colors.
- B. No individual color selections will be made until after approval of all pertinent materials and equipment and after receipt of appropriate samples in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.
- C. Contractor shall request priority in writing for any item requiring advance ordering to maintain the approved Construction Schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall deliver manufactured materials in original packages, containers, or bundles (with seals unbroken), bearing name or identification mark of manufacturer.
- B. Contractor shall deliver fabrications in as large assemblies as practicable; where specified as shop-primed or shop-finished, package or crate as required to preserve such priming or finish intact and free from abrasion.
- C. Contractor shall store materials in such a manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted.

- D. Materials are not acceptable that have been warehoused for long periods of time, stored or transported in improper environment, improperly packaged, inadequately labeled, poorly protected, excessively shipped, deviated from normal distribution pattern, or reassembled.
- E. Contractor shall store material so as to cause no obstructions of sidewalks, roadways, access to the Site or buildings, and underground services. Contractor shall protect material and equipment furnished under Contract.
- F. Contractor may store materials on Site with prior written approval by the District, all material shall remain under Contractor's control and Contractor shall remain liable for any damage to the materials. Should the Project Site not have storage area available, the Contractor shall provide for off-site storage at a bonded warehouse and with appropriate insurance coverage at no cost to District.
- G. When any room in Project is used as a shop or storeroom, the Contractor shall be responsible for any repairs, patching, or cleaning necessary due to that use. Location of storage space shall be subject to prior written approval by District.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers listed in various sections of Contract Documents are names of those manufacturers that are believed to be capable of supplying one or more of items specified therein.
- B. The listing of a manufacturer does not imply that every product of that manufacturer is acceptable as meeting the requirements of the Contract Documents.

2.02 FACILITIES AND EQUIPMENT

Contractor shall provide, install, maintain, and operate a complete and adequate facility for handling, the execution, disposal, and distribution of material and equipment as required for proper and timely performance of Work connected with Contract.

2.03 MATERIAL REFERENCE STANDARDS

Where material is specified solely by reference to "standard specifications" and if requested by District, Contractor shall submit for review data on actual material proposed to be incorporated into Work of Contract listing name and address of vendor, manufacturer, or producer, and trade or brand names of those materials, and data substantiating compliance with standard specifications.

PART 3 - EXECUTION

3.01 WORKMANSHIP

- A. Where not more specifically described in any other Contract Documents, workmanship shall conform to methods and operations of best standards and accepted practices of trade or trades involved and shall include items of fabrication, construction, or installation regularly furnished or required for completion (including finish and for successful operation, as intended).
- B. Work shall be executed by tradespersons skilled in their respective lines of Work. When completed, parts shall have been durably and substantially built and present a neat appearance.

3.02 COORDINATION

- A. Contractor shall coordinate installation of Work so as to not interfere with installation of others. Adjustment or rework because of Contractor's failure to coordinate will be at no additional cost to District.
- B. Contractor shall examine in-place work for readiness, completeness, fitness to be concealed or to receive other work, and in compliance with Contract Documents. Concealing or covering Work constitutes acceptance of additional cost which will result should in-place Work be found unsuitable for receiving other Work or otherwise deviating from the requirements of the Contract Documents.

3.03 COMPLETENESS

Contractor shall provide all portions of the Work, unless clearly stated otherwise, installed complete and operational with all elements, accessories, anchorages, utility connections, etc., in manner to assure well-balanced performance, in accordance with manufacturer's recommendations and by Contract Documents. For example, electric water coolers require water, electricity, and drain services; roof drains require drain system; sinks fit within countertop, etc. Terms such as "installed complete," "operable condition," "for use intended," "connected to all utilities," "terminate with proper cap," "adequately anchored," "patch and refinish," "to match similar," should be assumed to apply in all cases, except where completeness of functional or operable condition is specifically stated as not required.

3.04 APPROVED INSTALLER OR APPLICATOR

Installation by a manufacturer's approved installer or applicator is an understood part of Specifications and only approved installer or applicator is to provide on-site Work where specified manufacturer has on-going program of approving (i.e. certifying, bonding, re-warranting) installers or applicators. Newly established relationships between a manufacturer and an installer or applicator who does not have other approved applicator work in progress or completed is not approved for this Project.

3.05 MANUFACTURER'S RECOMMENDATIONS

All installations shall be in accordance with manufacturer's published recommendations and specific written directions of manufacturer's representative. Should Contract Documents differ from recommendations of manufacturer or directions of his representative, Contractor shall analyze differences, make recommendations to the District and the Architect in writing, and shall not proceed until interpretation or clarification has been issued by the District and/or the Architect.

END OF DOCUMENT

DOCUMENT 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;
- B. Special Conditions.

1.02 RELATED CODES:

- A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.
- B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

1.03 OBSERVATION AND SUPERVISION:

- A. The District and Architect or their appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.
- B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:
 - (1) The Project Inspector and Special Inspector(s) shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections. The Contractor shall provide facilities and operation of equipment as needed, and access as required and shall provide assistance for sampling or measuring materials.
 - (2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.

- (3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Part 1, Title 24, Section 4-336.

1.04 TESTING AGENCIES:

- A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.
- B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."
- C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing Laboratory." The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

1.05 TESTS AND INSPECTIONS:

- A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.
- B. The Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.
- C. The District will pay for first inspections and tests required by the "CCR", and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:
 - (1) Tests and observations for earthwork and paving.
 - (2) Tests for concrete mix designs, including tests of trial batches.
 - (3) Tests and inspections for structural steel work.
 - (4) Field tests for framing lumber moisture content.

- (5) Additional tests directed by the District that establish that materials and installation comply with the Contract Documents.
- (6) Tests and observations of welding and expansion anchors.
- D. The District may at its discretion, pay and then back charge the Contractor for:
 - (1) Retests or reinspections, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.
 - (2) Uncovering of work in accordance with Contract Documents.
 - (3) Testing done on weekends, holidays, and overtime will be chargeable to the Contractor for the overtime portion.
 - (4) Testing done off Site.
- E. Testing and inspection reports and certifications:
 - (1) If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification.
 - (a) The District;
 - (b) The Construction Manager, if any;
 - (c) The Architect;
 - (d) The Consulting Engineer, if any;
 - (e) Other engineers on the Project, as appropriate;
 - (f) The Project Inspector; and
 - (g) The Contractor.
 - (2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

PART 2 - PRODUCTS

2.01 TYPE OF TESTS AND INSPECTIONS:

- A. Testing and inspection shall be in accordance with DSA Form 103 (or current version)
- B. Slump Test
ASTM C 143
- C. Concrete Tests

Testing agency shall test concrete used in the work per the following paragraphs:

- (1) Compressive Strength:
 - (a) Minimum number of tests required: One (1) set of three (3) cylinders for each 100 cubic yards (Sec. 2604(h) 01) of concrete or major fraction thereof, placed in one (1) day. See Title 24, Section 2605(g).
 - (b) Two cylinders of each set shall be tested at twenty-eight (28) days. One (1) cylinder shall be held in reserve and tested only when directed by the Architect or District.
 - (c) Concrete shall test the minimum ultimate compressive strength in twenty-eight (28) days, as specified on the structural drawings.
 - (d) In the event that the twenty-eight (28) day test falls below the minimum specified strength, the effective concrete in place shall be tested by taking cores in accordance with UBC Standard No. 26-13 and tested as required for cylinders.
 - (e) In the event that the test on core specimens falls below the minimum specified strength, the concrete will be deemed defective and shall be removed and replaced upon such direction of the Architect, and in a manner acceptable to the Division of the State Architect.
- D. Reinforcing, Steel
- E. Structural Steel Per Title 24 and as noted:
 - (1) Material: Steel per Table in Title 24, Section 2712.
 - (2) Qualification of Welders (UBC Std. 27-6).
 - (3) Shop fabrication (Section 2712(d). Structural steel only).
 - (4) Shop and field welding (Section 2712(e)).

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Site Standards; and
- D. Construction Waste Management and Disposal.

1.02 TEMPORARY UTILITIES:

- A. Electric Power and Lighting:
 - (1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.
 - (2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.
 - (3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.
 - (4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.
- B. Heat and Ventilation:
 - (1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified

minimum conditions for the installation and curing of materials, and to protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.

- (2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.
- (3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water:

- (1) Contractor shall pay for water used during the course of the Work. Contractor shall coordinate and pay for installation or use of water meter in compliance with local water agency requirements. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s) on the Site, or other location approved by the local water agency, to point of intended use.
- (2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.
- (3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities:

- (1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.
- (2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service:

- (1) Contractor shall arrange with local telephone service company for telephone service as required for the performance of the Work. Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.

- (2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

- (1) Contractor shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California Fire, State Fire Marshall and/or its designee.
- (2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

- (1) Contractor shall provide trash removal on a timely basis. Under no circumstance shall Contractor use District trash service.

H. Field Office:

- (1) If Contractor chooses to provide a field office, it shall be an acceptable construction trailer that is well-lit and ventilated. The construction trailer shall be equipped with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Trailer and equipment are the property of the Contractor and must be removed from the Site upon completion of the Work. Contractor may use the corridor adjacent to the construction area for an office area, if approved in writing by District.
- (2) Contractor shall provide any additional electric lighting and power required for the trailer. Contractor shall make adequate provisions for heating and cooling as required.

I. Temporary Facilities:

- (1)

1.03 CONSTRUCTION AIDS:

A. Plant and Equipment:

- (1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workers. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.
- (2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.

- B. None of the District's tools and equipment shall be used by Contractor for the performance of the Work.

1.04 BARRIERS AND ENCLOSURES:

- A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.
- B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.
- C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.
- D. Tree and Plant Protection:
 - (1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.
 - (2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations, or as denoted on the Plans.
 - (3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.
 - (4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.
 - (5) Excavation around Trees:
 - (a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.

- (b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.
- (c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.
- (d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.
- (e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.
- (f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

1.05 SECURITY:

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

1.06 TEMPORARY CONTROLS:

A. Noise Control:

- (1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.
- (2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

- (1) Equipment and impact tools shall have intake and exhaust mufflers.
- (2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

- (1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.
- (2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.
- (3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.
- (4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water:

Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

- (1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.
- (2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting:

- (1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.07 JOB SIGN(S):

A. General:

- (1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Design Professional; locate sign as approved by the District.
- (2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

- (1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.
- (2) Sign Surface: Minimum 3/4-inch exterior grade plywood.
- (3) Rough Hardware: Galvanized.
- (4) Paint: Exterior quality, of type and colors selected by the District and/or the Design Professional.

C. Fabrication:

- (1) Contractor shall fabricate to provide smooth, even surface for painting.
- (2) Size: 4'-0" x 8'-0", unless otherwise indicated.
- (3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.
- (4) Text and Graphics: As indicated.

1.08 PUBLICITY RELEASES:

- A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s) without the written permission of the District.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF DOCUMENT

DOCUMENT 01 50 13

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

- A. Administrative and procedural requirements for the following:
 - (1) Salvaging non-hazardous construction waste.
 - (2) Recycling non-hazardous construction waste.
 - (3) Disposing of non-hazardous construction waste.

1.03 DEFINITIONS:

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS:

- A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of sixty-five percent (65%) by weight (or by volume, but not a combination) of total waste generated by the Work.

1.05 SUBMITTALS:

- A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:
 - (1) Material category.
 - (2) Generation point of waste.
 - (3) Total quantity of waste in tons or cubic yards.
 - (4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.
 - (5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.
 - (6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.
 - (7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- H. Qualification Data: For Waste Management Coordinator.
- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- J. Submittal procedures and quantities are specified in Document 01 33 00.

1.06 QUALITY ASSURANCE:

- A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:
 - (1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - (2) Review requirements for documenting quantities of each type of waste and its disposition.
 - (3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - (4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - (5) Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN:

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measurement throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

- (1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
- (2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
- (3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
- (4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
- (5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
- (6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION:

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - (1) Comply with Document 01 50 00 for operation, termination, and removal requirements.
- B. [Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.]
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - (1) Distribute waste management plan to everyone concerned within 3 days of submittal return.

- (2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - (1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - (2) Comply with Document 01 50 00 for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE:

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - (1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.
 - (a) Inspect containers and bins for contamination and remove contaminated materials if found.
 - (2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - (3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - (4) Store components off the ground and protect from the weather.
 - (5) Remove recyclable waste off District property and transport to recycling receiver or processor.
- D. Packaging:
 - (1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - (2) Polystyrene Packaging: Separate and bag material.

- (3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.
- (4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- E. Site-Clearing Wastes: Chip brush, branches, and trees on site.
- F. Wood Materials:
 - (1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - (2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 - (1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.03 DISPOSAL OF WASTE:

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - (1) Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on site.
 - (2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF DOCUMENT

FIELD OFFICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

- A. Requirements for Field Offices and Field Office Trailers.

1.03 SUMMARY:

- A. General: Contractor shall provide District's Field Office Trailer and contents, for District's use exclusively, during the term of the Contract.
- B. Property: Trailer, furniture, furnishings, equipment, and the like, supplied by the Contractor with the Office Trailer shall remain the property of the Contractor; District property items installed, delivered, and the like by District within the Office Trailer will remain District's property.
- C. Modifications: District reserves the right to modify the trailer or contents, or both, as may be deemed proper by District.
- D. Condition: Trailer and contents shall be clean, neat, substantially finished, in good, proper, and safe condition for use, operation, and the like; the trailer and contents shall not be required to be new.
- E. Installation Timing: Provide safe, fully furnished, functional, proper, complete, and finished trailer properly ready for entire use, within fourteen (14) calendar days of District's notification of the issuance of Notice to Proceed.

1.04 SUBMITTALS:

- A. General: Submit submittals to District in quantity, format, type, and the like, as specified herein.
- B. Office Trailer Data: One (1) copy of manufacturer's descriptive data, technical descriptions, regulatory compliance, industry standards, installation, removal, and maintenance instructions.

- C. Equipment Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- D. Furniture and Furnishings Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- E. Plans: One (1) reproducible copy of appropriately scaled plans of trailer layout. Plans shall include, but not be limited to: lighting; furniture; equipment; telephone and electrical outlets; and the like.
- F. Product Samples: One (1) complete and entire unit of each type, if directed by District.

1.05 QUALITY ASSURANCE

- A. Standards: In the event that provisions of codes, regulations, safety orders, Contract Documents, referenced manufacturer's specifications, manufacturer's instructions, industry standards, and the like, are in conflict, the more restrictive and higher quality shall govern.
- B. Installer: Installer or Installers engaged by Contractor must have a minimum of five (5) years of documented and properly authenticated successful experience of specialization in the installation of the items or systems, or both, specified herein.
- C. Manufacturer: Contractor shall obtain products from nationally and industry recognized Manufacturer with five (5) years minimum, of immediately recent, continuous, documented and properly authenticated successful experience of specialization in the manufacture of the product specified herein.
- D. State Personnel Training: Provide proper training for maintenance and operations, including emergency procedures, and the like, as directed by District.
- E. Units: Shall be sound and free of defects, and shall not include any damage or defect that will impair the safety, installation, performance, or the durability of the entire Office Trailer and appurtenant systems.

1.06 REGULATORY REQUIREMENTS

- A. General: Work shall be executed in accordance with applicable Codes, Regulations, Statutes, Enactments, Rulings, Laws, each authority having jurisdiction, and including, but not limited to, Regulatory Requirements specified herein.
- B. California Building Standards Code ("CBSC").
- C. California Code of Regulations, Title 25, Chapter 3, Sub Chapter 2, Article 3 ("CCR").
- D. Coach Insignia: Trailer shall display California Commercial Coach Insignia; such insignia shall be deemed to show that the trailer is in accordance with the Construction and Fire Safety requirements of CCR.

PART 2 – PRODUCTS

2.01 FIELD OFFICE TRAILER

- A. General: Provide entire Field Office Trailer of type, function, operation, capacity, size, complete with controls, safety devices, accessories, and the like, for proper and durable installation. Partitions, walls, ceiling, and other interior and exterior surfaces shall be appropriately finished, including, but not limited to, trim, painting, wall base, floor covering, suspended or similar ceiling, and the like; provide systems, components, units, nuts, bolts, screws, anchoring devices, fastening devices, washers, accessories, adhesives, sealants, and other items of type, grade, and class required for the particular use, not identified but required for a complete, weather-tight, appropriately operating, and finished installation.
- B. Manufacturers: General Electric Capital Modular Space; The Space Place, Inc.; or equal.
- C. Program: Provide a wheel-mounted trailer with stairs, landings, platforms, ramps, and the like, in good, proper, safe, clean, and properly finished condition; with proper heavy duty locks, and other proper and effective security at all doors, windows, and the like. Trailer shall be maintained in good, proper, safe, clean, and properly finished condition during the Contract.
 - (1) Nominal Trailer Size: Four hundred eighty (480) square feet, minimum.
 - (2) Stairs, Platform: Properly finished stairs, platforms, and ramps.
 - (3) Doors: Two (2), three (3) foot wide exterior doors with locksets; finished ramp, steps, and entry platform at each exterior door.
 - (4) Keys: Submit five (5) keys for each door, window, furniture unit, and the like. There shall be no other key copies or originals available; each key shall be identified for District; and shall be labeled, or tagged or both, as directed by District.
 - (5) HVAC:
 - (6) Lighting: Sixty-five (65) foot-candles illumination minimum at any point, at thirty (30) inches above finished floor throughout from fluorescent light source, exclusively, or as directed by District.
 - (7) Electrical Outlets: One (1) duplex outlet evenly spaced every twelve (12) linear horizontal feet of wall face, and electrical service ready for use.
 - (8) Telephones and Telephone Outlets: Two (2) telephone lines wired, connected to telephone utility service, and ready for use, and two (2) telephone instruments, each with two (2)-line capability, speed dial and hands-free feature. Locate each outlet as directed by District.

- (9) Voicemail Messaging System or Answering Machine: One (1) unit, two (2)-line; digital.

2.02 FIELD OFFICE TRAILER ITEMS

- A. General: Provide the Field Office Trailer with the following arranged into two (2) workstations:
 - (1) Desks: Two (2) desks: thirty-six (36) inches by sixty (60) inches; steel, laminated plastic top; locking, one (1) or two (2) file drawers single pedestal; steel; provide five (5) keys to District.
 - (2) Tables: Two (2) tables; thirty-six (36) inches by sixty (60) inches; twenty-nine (29) inches high; steel, laminated plastic top tables; one (1) at each desk.
 - (3) Chairs: Two (2) chairs: swivel; steel; with seat cushion and arms; one (1) at each desk.
 - (4) Waste Baskets: Two (2) waste baskets, one at each desk.
- B. Furniture and Equipment: Provide in the space located to effect efficient and logical use.
 - (1) File cabinet: One (1); four (4) drawer; lateral; steel locking.
 - (2) Plan Table: One (1) plan table: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawers.
 - (3) Drafting Stool: One (1) drafting stool; swiveling; steel; padded; adjustable; with footrest and casters.
 - (4) Bookshelf: One (1) bookshelf: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawer.
 - (5) Plan Rack: One (1) wheel mounted plan rack.
 - (6) Waste Baskets: One (1) large waste basket.
 - (7) Coat/Hat Hanger: Wall mounted with minimum capacity for four (4) garments and ten (10) hats.
 - (8) Document Management System: Shall include an integrated high-volume printer, copier, and facsimile machine, including stand, base, and storage cabinet; and shall include the following features:
 - (a) Type: Laser, dry electrostatic transfer, plain paper, digital, multi-function imaging system.
 - (b) Network: Ethernet or Token Ring network ready, Plug-and-Play.

- (c) Print, send/receive facsimile from any connected workstation.
 - (d) Resolution: Six hundred (600) dots per inch by six hundred (600) dots per inch, minimum.
 - (e) Print Speed: Twenty (20) pages per minute, minimum.
 - (f) Copies: Twenty (20) copies per minute, minimum.
 - (g) Document Handler: Forty (40) sheet, minimum
 - (h) Collator: Forty (40) bin, minimum, with stapling.
 - (i) Duplexing: Capable.
 - (j) Paper Size: Capable of handling paper sizes to eleven (11) inches by seventeen (17) inches.
 - (k) Paper Cassettes: One (1) each for eight and one half (8.5) inches by eleven (11) inches, eight and one half (8.5) inches by fourteen (14) inches, and eleven (11) inches by seventeen (17) inches paper sizes; minimum two hundred fifty (250) sheets per cassette.
 - (l) Reduction/Enlargement: Capable of reduction to twenty-five percent (25%) and enlargement to two hundred percent (200%).
 - (m) Facsimile Electronic Storage: Capable of storing minimum of fifty (50) speed dial numbers, group faxing and broadcast faxing.
 - (n) Facsimile Scanning: Capable of scanning into memory a minimum of one hundred (100) pages with maximum scan time of three (3) seconds per page.
 - (o) Halftone: Sixty-four (64) levels.
 - (p) Redial: Automatic and Manual.
- (9) Maintenance: Contractor shall purchase service agreements for each unit of equipment for the duration of the project plus two (2) months, and shall maintain all equipment in proper working condition. Service agreements shall include provision for replacement of toner cartridges and other items required to effect proper unit use. Service agreements shall also provide for:
- (a) Unlimited Service Calls.
 - (b) Same Day Response.
 - (c) All parts, labor, preventative maintenance and mileage.

- (d) All chemicals, such as toner, fixing agent, and the like.
 - (e) System training and setup.
- (10) Portable Toilets: Two (2); each shall include a urinal; each unit shall be a properly enclosed chemical unit conforming to ANSI Z4.3.
- (a) Location: As directed by District.
 - (b) Maintenance: Maintain each unit and surrounding areas in a clean, hygienic and orderly manner, at all time. Empty, clean, and sanitize each unit each day at a location and time as directed by District.
 - (c) Removal: Relocate, or remove from the site, each Portable Toilet. Upon such directive by District, the Contractor shall forthwith relocate or remove each Portable Toilet and submit the affected areas to a condition which existed prior to the installation of each Portable Toilet, within three (3) calendar days, or as directed by District in writing, at no cost to District.

2.03 UTILITY AND SERVICES

- A. Telephone Service: Contractor shall provide and interface the entire telephone service, and shall properly and timely pay for telephone service for District's non-long-distance use.
- B. Electrical Service: Provide all proper connections and continuously pay for service for the duration of the Work.

2.04 FINISHES

- A. General: Manufacturer standard finish system over surfaces properly cleaned, pretreated, and prepared to obtain proper bond; all visible surfaces shall be coated.
- B. Finish: Color as selected by District from manufacturer standard palette.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General: Properly prepare area and affected items to receive the Work. Set Work accurately in location, alignment, and elevation; rigidly, securely, and firmly anchor to appropriate structure; install plumb, straight, square, level, true, without racking, rigidly anchored to proper solid blocking, substrate, and the like; provide appropriate type and quantity of reinforcements, fasteners, adhesives, self-adhesive and other tapes; lubricants, coatings, accessories, and the like, as required for a complete, structurally rigid, stable, sound, and appropriately finished installation, in accordance with manufacturer's published instructions, and as indicated. The more restrictive and higher quality requirement shall govern. Moving parts shall be properly secured, without binding, looseness, noise, and the like.

- B. Installation: Install in accordance with 25 CCR 3.2.3 and as directed by District; jack up trailer and level both ways; mount on proper concrete piers with all load off wheels; provide required tie down and accessories per Section 4368 of referenced CCR, and as directed by District.
- C. Rejected Work: Work, materials, unit, items, systems, and the like, not accepted by District shall be deemed rejected, and shall forthwith be removed and replaced with proper and new Work, materials, unit, items, systems, and the like at no cost to District.
- D. Standard: Comply with manufacturer's published instructions, or with instructions as shown or indicated; the more restrictive and higher quality requirement shall govern.
- E. Location: As directed by District.
- F. Fire Resistance: Construct and install in accordance with UL requirements.
- G. Maintenance: Contractor shall maintain trailer and adjacent areas in a safe, clean and hygienic condition throughout the duration of the Work, and as directed by District. Properly repair or replace furniture or other items, as directed by District. Properly remove unsafe, damaged, or broken furniture, or similar items, and replace with safe and proper items. Contractor shall pay cost of all services, repair, and maintenance, or replacement of each item.
- H. Janitorial Service: Provide professional janitorial services, including, but not limited to, trash, waste paper baskets, fill paper dispensers; clean and dust all furniture, files, and the like; sweep and mop resilient and similar flooring; and vacuum carpeting and similar flooring.
 - (1) Frequency: Two (2) times per week, minimum.
- I. Removal: Properly remove the Office Trailer and contents from the Site upon completion of the Contract, or as directed by District in writing. Forthwith properly patch and repair affected areas; replace damaged items with new items. Carefully and properly inventory, clean, pack, store, and protect District property; submit District property to District at a date, time and location as directed by District.

END OF DOCUMENT

DOCUMENT 01 64 00

OWNER-FURNISHED PRODUCTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Materials and Equipment.

1.02 SECTION INCLUDES

- A. Requirements for the following:
 - (1) Installing Owner-furnished materials and equipment.
 - (2) Providing necessary utilities, connections and rough-ins.

1.03 DEFINITIONS

- A. Owner: District, who is providing/furnishing materials and equipment.
- B. Installing Contactor: Contractor, who is installing the materials and equipment furnished by the Owner.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Receive, store and handle products in accordance with the manufacturer's instructions.
- B. Protect equipment items as required to prevent damage during storage and construction.

PART 2 – PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Installing Contractor's Responsibilities:
 - (1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.

Provide mounting and utility rough in for all items where required.

- (a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.
- B. Owner and Installing Contractor(s) Responsibilities:
- (1) Owner-Furnished/Contractor Installed ("OFICI"): Furnished by the Owner; installed by the Installing Contractor.
 - (a) General: Owner and Installing Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.
 - (b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00, Materials and Equipment, Article 1.04.
 - (c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installing Contractor.
 - (d) The Installing Contractor shall:
 - 1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installing Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.
 - 2) Coordinate timely delivery. Installing Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installing Contractor shall assume responsibility for such defects and omissions.
 - 3) Store materials and equipment until ready for installation and protect from loss and damage. Installing Contractor is responsible for providing adequate storage space.
 - 4) Coordinate with other bid package contractors and field measurement to ensure complete installation.
 - 5) Uncrate, assemble, and set in place.
 - 6) Provide adequate supports.

- 7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.
 - 8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.
 - 9) Provide anchorage and/or bracing as required for seismic restraint per Title 24, UBC Standard 27-11 and all other applicable codes.
 - 10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.
- C. Compatibility with Space and Service Requirements:
- (1) Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.
 - (2) Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.
- D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.

2.02 FURNISHED MATERIALS AND EQUIPMENT

- A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install equipment items in accordance with the manufacturer's instructions.
- B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.
- C. Make electrical and mechanical connections as indicated and required.
- D. Touch-up and restore damaged or defaced finishes to the Owner's satisfaction.

3.02 CLEANING AND PROTECTION

- A. Repair or replace items not acceptable to the Architect or Owner.
- B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the Owner.

END OF DOCUMENT

SECTION 01 66 00

PRODUCT DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;
- B. Special Conditions.

1.02 PRODUCTS

- A. Products are as defined in the General Conditions.
- B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.
- C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

- A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.
- B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.
- C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

- A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.
- C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.

- D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.
- E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.
- F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;
- B. Special Conditions;
- C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED:

- A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:
 - (1) Survey work required in execution of the Project.
 - (2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS:

- A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.
- B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:
 - (1) Make no changes or relocation without prior written notice to District and Architect.
 - (2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - (3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS:

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS:

- A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.
- B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.
- C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 COMPLIANCE WITH LAWS:

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 NONCONFORMING WORK:

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

DOCUMENT 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;
- B. Special Conditions;
- C. Hazardous Materials Procedures and Requirements;
- D. Hazardous Materials Certification;
- E. Lead-Based Paint Certification;
- F. Imported Materials Certification.

1.02 CUTTING AND PATCHING:

- A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:
 - (1) Make several parts fit together properly.
 - (2) Uncover portions of Work to provide for installation of ill-timed Work.
 - (3) Remove and replace defective Work.
 - (4) Remove and replace Work not conforming to requirements of Contract Documents.
 - (5) Remove Samples of installed Work as specified for testing.
 - (6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
 - (7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.
- B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of

installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

- C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS:

- A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:
 - (1) The work of the District or other trades.
 - (2) Structural value or integrity of any element of Project.
 - (3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.
 - (4) Efficiency, operational life, maintenance or safety of operational elements.
 - (5) Visual qualities of sight-exposed elements.
- B. Contractor's Request shall also include:
 - (1) Identification of Project.
 - (2) Description of affected Work.
 - (3) Necessity for cutting, alteration, or excavations.
 - (4) Affects of Work on District, other trades, or structural or weatherproof integrity of Project.
 - (5) Description of proposed Work:
 - (a) Scope of cutting, patching, alteration, or excavation.
 - (b) Trades that will execute Work.
 - (c) Products proposed to be used.
 - (d) Extent of refinishing to be done.
 - (6) Alternates to cutting and patching.
 - (7) Cost proposal, when applicable.

- (8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.
- (9) Written permission of District or other District contractor(s) whose work will be affected.

1.04 QUALITY ASSURANCE:

- A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.
- B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS:

- A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.
- B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.
- B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION:

- A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.
- B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION:

- A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.
- B. Contractor shall provide devices and methods to protect other portions of Project from damage.
- C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION:

- A. With respect to performance, Contractor shall:
 - (1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.
 - (2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.
 - (3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.
- B. Contractor shall employ original installer or fabricator to perform cutting and patching for:
 - (1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.
 - (2) Sight-exposed finished surfaces.
- C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances,

and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.

- D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.
- E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with requirements of the Contract Documents and as required to match surrounding areas and surfaces.
- F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF DOCUMENT

DOCUMENT 01 76 00

ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;
- B. Special Conditions.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:

- A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.
- B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.
- B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

3.02 PREPARATION:

- A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.
- B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.

- C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.
- D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.
- E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION:

- A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.
- B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.
- C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.
- D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat and square or straight transition to adjacent finishes.
- E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS:

- A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS:

- A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.

- C. Contractor shall trim and seal existing wood doors and shall trim and paint metal doors as necessary to clear new floor finish and refinish trim as required.
- D. Contractor shall fit Work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES:

- A. Contractor shall patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections, in the area where the Work is performed.
- B. Contractor shall repair substrate prior to patching finish.

3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS:

- A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored by Contractor to their original condition or better, where indicated.
- B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.
- C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES:

- A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.
- B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

3.09 CLEANING:

- A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

DOCUMENT 01 77 00

CONTRACT CLOSEOUT AND FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of Work;
- B. Special Conditions;
- C. Temporary Facilities and Controls.

1.02 CLOSEOUT PROCEDURES

Contractor shall comply with all closeout provisions as indicated in the General Conditions.

1.03 FINAL CLEANING

- A. Contractor shall execute final cleaning prior to final inspection.
- B. Contractor shall clean interior and exterior glass and all surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.
- C. Contractor shall clean equipment and fixtures to a sanitary condition.
- D. Contractor shall replace filters of operating equipment.
- E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.
- F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.
- G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site and surrounding areas.

1.04 ADJUSTING

Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 RECORD DOCUMENTS AND SHOP DRAWINGS

- A. Contractor shall legibly mark each item to record actual construction, including:
 - (1) Measured depths of foundation in relation to finish floor datum.
 - (2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit surface improvements.
 - (3) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - (4) Field changes of dimension and detail.
 - (5) Details not on original Contract Drawings
 - (6) Changes made by modification(s).
 - (7) References to related Shop Drawings and modifications.
- B. Contractor will provide one set of Record Drawings to District.
- C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

1.06 INSTRUCTION OF DISTRICT PERSONNEL

- A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months or by the change of season.
- C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when the need for such data becomes apparent during instruction.
- E. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.

- B. Contractor shall provide District with all required Operation and Maintenance Data at one time. Partial or piecemeal submissions of Operation and Maintenance Data will not be accepted.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF DOCUMENT

DOCUMENT 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of the Work;
- B. Special Conditions.

1.02 QUALITY ASSURANCE:

Contractor shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT:

- A. Contractor shall prepare data in the form of an instructional manual entitled "OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS" ("Manual").
- B. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size. When multiple binders are used, Contractor shall correlate data into related consistent groupings.
- C. Cover: Contractor shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.
- D. Contractor shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.
- E. Contractor shall provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Contractor shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME:

- A. Table of Contents: Contractor shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants,

Subcontractor(s), and Contractor with name of responsible parties; and schedule of products and systems, indexed to content of the volume.

- B. For Each Product or System: Contractor shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Contractor shall mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Contractor shall supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Contractor shall not use Project Record Documents as maintenance drawings.
- E. Text: The Contractor shall include any and all information as required to supplement product data. Contractor shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- F. Warranties and Bonds: Contractor shall bind in one copy of each.

1.05 MANUAL FOR MATERIALS AND FINISHES:

- A. Building Products, Applied Materials, and Finishes: Contractor shall include product data, with catalog number, size, composition, and color and texture designations. Contractor shall provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Contractor shall include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Contractor shall include product data listing applicable reference standards, chemical composition, and details of installation. Contractor shall provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: Contractor shall include all additional requirements as specified in the Specifications.
- E. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS:

- A. Each Item of Equipment and Each System: Contractor shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Contractor shall include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.

- B. Panelboard Circuit Directories: Contractor shall provide electrical service characteristics, controls, and communications.
- C. Contractor shall include color coded wiring diagrams as installed.
- D. Operating Procedures: Contractor shall include start-up, break-in, and routine normal operating instructions and sequences. Contractor shall include regulation, control, stopping, shut-down, and emergency instructions. Contractor shall include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Contractor shall include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Contractor shall provide servicing and lubrication schedule, and list of lubricants required.
- G. Contractor shall include manufacturer's printed operation and maintenance instructions.
- H. Contractor shall include sequence of operation by controls manufacturer.
- I. Contractor shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Contractor shall provide control diagrams by controls manufacturer as installed.
- K. Contractor shall provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- L. Contractor shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Contractor shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Additional Requirements: Contractor shall include all additional requirements as specified in Specification(s).
- O. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.07 SUBMITTAL:

- A. Contractor shall submit to the District for review two (2) copies of preliminary draft or proposed formats and outlines of the contents of the Manual within thirty (30) days of Contractor's start of Work.
- B. For equipment, or component parts of equipment put into service during construction and to be operated by District, Contractor shall submit draft

content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.

- C. Contractor shall submit two (2) copies of a complete Manual in final form prior to final Application for Payment. Copy will be returned with Architect/Engineer comments. Contractor must revise the content of the Manual as required by District prior to District's approval of Contractor's final Application for Payment.
- D. Contractor must submit two (2) copies of revised Manual in final form within ten (10) days after final inspection.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 36

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Warranty/Guarantee Information;
- B. Special Conditions.

1.02 FORMAT

- A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.
- B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.
- C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.
- D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

1.03 PREPARATION:

- A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty blank until the date of completion is determined.
- B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.
- C. Contractor shall co-execute submittals when required.
- D. Contractor shall retain warranties until time specified for submittal.

1.04 TIME OF SUBMITTALS:

- A. For equipment or component parts of equipment put into service during construction with District's permission, Contractor shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.
- B. Contractor shall submit for District approval all warranties and related documents within ten (10) days after date of completion. Contractor must revise the warranties as required by the District prior to District's approval of Contractor's final Application for Payment.
- C. For items of work delayed beyond date of completion, Contractor shall provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as start of warranty period.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 39

RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Documents on Work;
- B. Special Conditions.

PART 2 - RECORD DRAWINGS

2.01 GENERAL:

- A. As indicated in the Contract Documents, the District will provide Contractor with one set of reproducible, full size original Contract Drawings
- B. Contractor shall maintain at each Project Site one set of marked-up plans and shall transfer all changes and information to those marked-up plans, as often as required in the Contract Documents, but in no case less than once each month. Contractor shall submit to the Project Inspector one set of reproducible vellums of the Project Record Drawings ("As-Builts") showing all changes incorporated into the Work since the preceding monthly submittal. The As-Builts shall be available at the Project Site. The Contractor shall submit reproducible vellums at the conclusion of the Project following review of the blueline prints.
- C. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.
- D. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by without limitation Change Orders, Construction Claim Directives, RFI's, and Addenda, shall be accurately and legibly recorded by Contractor.
- E. Locations and changes shall be done by Contractor in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

2.02 RECORD DRAWING INFORMATION:

- A. Contractor shall record the following information:
 - (1) Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.

- (2) Actual numbering of each electrical circuit to match panel schedule.
- (3) Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Contract Drawings.
- (4) Locations of all items, not necessarily concealed, which vary from the Contract Documents.
- (5) Installed location of all cathodic protection anodes.
- (6) Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.
- (7) Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.
- (8) Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

- B. Contractor shall provide additional drawings as necessary for clarification.
- C. Contractor shall provide reproducible record drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."
- D. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide electronic copies of the drawings (in PDF format) with one file with all of the sheets and one set of individual sheet files at the conclusion of the Project.

PART 3 - RECORD SPECIFICATIONS

3.01 GENERAL:

- A. Contractor shall mark each section legibly to record manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.
- B. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide one electronic copy of the specifications (in PDF format) at the conclusion of the Project.

PART 4 - MAINTENANCE OF RECORD DOCUMENTS

4.01 GENERAL

- A. Contractor shall store Record Documents apart from documents used for construction as follows:
 - (1) Provide files and racks for storage of Record Documents.
 - (2) Maintain Record Documents in a clean, dry, legible condition and in good order.
- B. Contractor shall not use Record Documents for construction purposes.

PART 5 – PRODUCTS Not Used.

END OF DOCUMENT

DOCUMENT 01 91 00

COMMISSIONING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Contractor’s Submittals and Schedules, Drawings and Specifications;
- B. Special Conditions.
- C. Submittal Procedures: Procedures for submittal of product data and quality assurance submittals.
- D. Closeout Procedures: General closeout requirements.
- E. Sustainable Design Closeout Documentation: Closeout requirements relating to sustainable design certification.
- F. Appropriate Sections of Divisions 15 and 16 specify closeout and/or commissioning related requirements for specific pieces of equipment or building operating systems.

1.02 SECTION INCLUDES

- A. Equipment and system commissioning, including the following:
 - (1) Completion of commissioning procedures on specific equipment and systems as indicated under “Related Documents and Provisions” above.
 - (2) Verification of operational and functional performance of specific equipment and systems for compliance with the “Design Intent” as described in the “Related Documents and Provisions” indicated above.

1.03 REFERENCES

- A. [ASTM International (ASTM)]:
 - (1) [ASTM X000-00, Title of Standard].
 - (2) [ASTM X000-00, Title of Standard].
- B. [Name of Organization (Organization Acronym)]:

- (1) [Acronym, Standard or Document Number and Date of Issue, Title of Standard or Document].

1.04 DEFINITIONS

- A. Commissioning: The process of verifying that the installation and performance of selected building systems meet or exceed the specified design criteria and therefore satisfy the design intent.
- B. Deficiencies and Resolutions List: List of noted deficiencies discovered as result of commissioning process.
- C. Final Commissioning Report: Overall final commissioning document, prepared by the Systems Commissioning Authority, which details the actual commissioning procedures performed, inspection and testing results, and the final version of the deficiencies and resolutions list indicating that all issues discovered through the commissioning process have been verified as resolved.
- D. Functional Performance Testing Process: Documented testing of system parameters, under actual or simulated operating conditions.
- E. Pre-Commissioning Checklists: Installation and start-up items to be completed by the appropriate party prior to operational verification through functional testing.
- F. Physical Inspection Process: On-site inspection and review of related system components for conformance to the specifications.
- G. Systems Commissioning Authority (SCA): Independent entity under contract directly with the District or District's Representative responsible for performing the specified commissioning procedures.

1.05 DESCRIPTION OF CONSTRUCTION PHASE COMMISSIONING PROCESS

- A. As soon as practicable after the [bid award] [start of construction] the Systems Commissioning Authority (SCA) will conduct a pre-installation commissioning "kick-off" meeting with the contractors. Parties directly affected by the commissioning work will be required to attend. The SCA will explain the commissioning process in detail, and identify specific commissioning related responsibilities of the various parties.
- B. Commissioning status meetings will be scheduled to occur during construction to monitor progress and to help facilitate the commissioning process. Contractor representatives will be required to attend these meetings.
- C. Once contractors have provided the SCA with written verification indicating completion of installation and startup procedures, the SCA will conduct an on-site physical inspection of the specific systems and equipment.

- D. Upon confirmation of system readiness, the SCA will schedule with the contractors to perform functional compliance with the project specifications and drawings. The SCA will oversee the process and will provide the format and documentation for these tests.
- E. Deficiencies noted during these tests will be documented on the Deficiencies and Resolutions list. When corrected, issues will be resolved at the time of discovery. The responsible Contractor will resolve all other issues at a later date. All deficiencies will be noted by the SCA as either resolved or pending resolution.
- F. The construction commissioning process will be complete when all noted deficiencies have been corrected, proved to be compliance with the project specifications or otherwise resolved to the satisfaction of the District.

1.06 SYSTEMS COMMISSIONING AUTHORITY'S DUTIES AND RESPONSIBILITIES

- A. Meet and communicate with the District's representatives, Construction Manager, if any, Contractors, equipment manufacturers' representatives, Architect, Engineer and others as needed, to facilitate the commissioning process.
- B. Review commissioning related specifications, submittals and construction documents. Communicate noted deficiencies and concerns to the District, Architect and Engineer.
- C. Develop detailed and specific functional testing procedures for equipment and systems to be commissioned.
- D. Develop testing, adjusting and balancing (TAB) specifications. Oversee the TAB process.
- E. Perform site inspections and verify contractor readiness for the functional testing process. Document deficiencies for future resolution.
- F. Witness contractor performed functional testing process as appropriate to verify contractor compliance with the functional testing procedures. Document deficiencies for future resolution.
- G. Provide the District, Construction Manager, Contractor, Architect, and Engineer with a Final Commissioning Report to document the commissioning process and to verify that the commissioning process is complete.

1.07 DUTIES AND RESPONSIBILITIES OF OTHERS FOR COMMISSIONING

- A. The commissioning process will require the active participation of persons qualified to represent the District, Mechanical Engineer, Electrical Engineer, General Contractor, Equipment Manufacturers' Representatives, Mechanical Contractor, HVAC Contractor, Controls Contractor, TAB Contractor, Electrical Contractor, and other specific subcontractors, as deemed appropriate. The SCA will witness the final functional performance commissioning process.

Participants shall include in their contracts all costs necessary to participate in and complete the commissioning process.

- B. Contractor will assure the participation and co-operation of Subcontractors, as required to complete the commissioning process.
- C. The District will assure the participation of their chosen representatives as required to complete the commissioning process.
- D. The Architect will assure the participation of necessary representatives from the Design Team as required to complete the commissioning process. Design team members will provide prompt replies to requests for information issued during the commissioning process.
- E. It is the Contractor's specific responsibility to complete their respective start-up and checkout procedures, and to insure the complete readiness of equipment and systems, prior to the start of the functional performance testing phase. The SCA shall request written confirmation of system readiness for performance testing, from the appropriate subcontractor or Contractor. Once the SCA is provided with confirmation of all related systems completion, the actual date and times for the functional performance testing process will be confirmed. Contractors shall provide sufficient time, and qualified representatives, to complete this process.
- F. After a second failure of a system to successfully meet the criteria as set forth in the functional performance testing process, the Contractor shall reimburse the District for all costs associated with any additional re-testing efforts made necessary due to remaining Contractor related system deficiencies previously reported by the Contractor as corrected. These costs shall include salary, travel costs and per diem lodging costs (where applicable) for the SCA. Rates to be used:
 - Mileage: \$0.35/Mile
 - Per Diem Lodging: \$115.00/Day
 - Salary: \$100.00/Hour
- G. Training on related systems and equipment operation and maintenance shall only be scheduled to commence after final performance commissioning is satisfactorily completed, and systems are verified to be 100 percent complete and functional.

1.08 SUBMITTALS

- A. Submit under provisions of Document 01 33 00 Submittals.
- B. Pre-Commissioning Checklist Forms: Submit two (2) signed copies of the checklist forms to the SCA upon completion of all listed items.
- C. Equipment Manufacturer's Startup Forms: Submit two (2) completed copies of the installation and startup checklists provided by the equipment manufacturers to the SCA.

- D. Test Reports: Submit two (2) copies of test reports for equipment and systems to the SCA.
- E. Control Schematics: Submit two (2) copies of the control schematics for equipment, systems, and subsystems to the SCA.
- F. Inspection Records: Submit two (2) copies of the records of inspections for code compliance, and approved permits and licenses to operate the equipment and systems to the SCA.
- G. Operating Data: Submit two (2) copies of equipment and system operating data including all necessary instructions to facilitate operation to specified performance standards to the District.
- H. Maintenance Data: Submit two (2) copies of equipment and system maintenance data including all necessary information required to maintain the equipment and systems in continuous operation, such as the testing, balancing and adjusting report and the as-built drawings.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 02 41 00
SELECTIVE SITE DEMOLITION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Work required to demolish, modify, salvage, relocate, and dispose existing structures, pavements, utilities, fencing, and miscellaneous items as required for the construction of the improvements as shown on the Drawings and as specified.
2. Protect all on-site personnel and the public at all areas of demolition.
3. Complete erosion and dust control measures as specified in Section 31 25 13.
4. Protect, support, and maintain adjoining structure, utilities, site work facilities, and miscellaneous items surrounding the demolition work from damage or harmful effects.
5. In accordance with all applicable state and local laws, properly dispose of all hazardous materials as required, obtain EPA generator number from the OWNER, and prepare safety plans.

B. Related Sections. See Related Sections for additional requirements applicable to this Section (typical).

1. Section 01 11 00 – Summary of Work.
2. Section 01 50 00 – Temporary Facilities and Controls.

1.2 SELECTIVE SITE DEMOLITION WORK

A. Selective demolition work includes, but is not limited to:

1. General site work: Asphalt and concrete paving and slabs, fencing, storm drainage structures, sidewalks, curbs, gutters, concrete walls and slabs, signs, bollards, utilities, irrigation systems, and landscaping. Demolition of existing site work structures that conflict with the new Work shown on the Drawings.

2. Partial demolition of pavements to allow new work to connect, for conduit penetrations, or otherwise modify existing structures.

1.3 PROTECTION

- A. Maintain free and safe passage for all on-site personnel at all times.
- B. Prevent movement or settlement of structures or surrounding areas to demolition work. Provide bracing, shoring, and debris barriers as required and assume responsibility for the safety and support of affected structures.
- C. Protect existing finishes, equipment, and adjacent work which remains from damage. Cut finish surfaces such as masonry, tile, plaster, wood, gypsum wallboard, concrete, or metals by methods which will terminate or join work in a straight line at an appropriate point of division.
- D. Protect existing vegetation, landscaping and irrigation systems to remain.
- E. Cease operations and notify the ENGINEER immediately if the safety of any structure or utility appears to be endangered. Take additional precautions to properly support such structure(s) and do not resume demolition operations until safety is restored.
- F. Utility locations shown on the Drawings are approximate and may vary from where they are shown. The CONTRACTOR shall contact Underground Service Alert (800-642-2444) and obtain field marking to determine the exact locations of utilities owned by agencies. Record, preserve and protect the field markings.
- G. Blasting and the use of explosives shall not be permitted for any demolition work.
- H. Promptly repair any damage caused to facilities or landscaping by demolition operations as directed by the ENGINEER and at no additional cost to the OWNER. The minimum quality of repair shall be equal to that which existed prior to the start of the CONTRACTOR's work.

1.4 SCHEDULING

- A. Schedule all demolition work to meet the requirements of Section 01 32 16 and minimize disruption to the work of OWNER staff and the public. Exercise due concern and procedures for maintaining plant operation and diligently direct all activities towards maintaining continuous operation of the existing plant and minimizing operation inconvenience.

1.5 CONDITION OF STRUCTURES

- A. Conditions existing at the structures and areas to be demolished at the time of the bid period shall be maintained by the OWNER insofar as practical. Minor variations in small piping, electrical equipment, and miscellaneous materials shall be expected by the CONTRACTOR and this work shall be completed at no additional cost to the OWNER.

1.6 DISPOSAL OF MATERIAL REMOVED BY DEMOLITION WORK

- A. All materials removed by demolition work shall become the property of the CONTRACTOR as soon as actual demolition is initiated. The CONTRACTOR shall remove demolition materials as soon as possible but in no case shall store materials removed by demolition on the project site longer than 5 working days. Demolition materials other than concrete and soil shall be properly contained in covered waste disposal bins. Concrete and soil shall be tightly stockpiled until removal.

1.7 SUBMITTALS

- A. All submittals shall be in accordance with Section 01 33 00.
- B. Submit letters to the ENGINEER showing proposed start and finish dates, times, and detailed descriptions of demolition work a minimum of 14 days in advance of such work. See also Section 01 32 13.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS

- A. See Sections 32 12 16 and 32 13 13 for patching materials.

PART 3 - EXECUTION

3.1 SEQUENCE OF WORK

- A. The sequence of demolition and the modifications of existing facilities shall be in accordance with Section 01 32 16.
- B. The CONTRACTOR shall mark all facility components to be demolished in advance of demolition to permit ENGINEER review. The purpose of this requirement is to provide an opportunity to avoid unnecessary or erroneous demolition. The CONTRACTOR remains responsible for demolition as shown and specified in the Contract Documents.
- C. The CONTRACTOR shall schedule a meeting and meet with the ENGINEER at the site of the proposed demolition in advance of the start of demolition. CONTRACTOR shall ensure that subcontractors are present if necessary or requested by the ENGINEER.

3.2 REMOVAL OF STRUCTURES

- A. CONTRACTOR shall remove all components of structures shown or required to be removed.

3.3 REMOVAL AND ABANDONMENT OF BURIED PIPING

- A. Unless specifically noted on the Drawings to be abandoned-in-place, all abandoned buried piping shall be excavated and removed from the site.
- B. Piping specifically noted to be abandoned-in-place shall have each open end filled with concrete grout to a minimum distance of 5 feet or 5 pipe diameters, whichever is greater, unless otherwise specified or shown.

3.4 DEMOLITION OF AND ADJOINING TO ARCHITECTURAL FINISHES

- A. Demolition of finishes where adjoining finishes are to remain shall be carefully completed. Such special finishes include terrazzo, tile, stone, concrete, plaster, wood paneling, metal paneling, and drywall. Cuts shall be even, straight, and parallel to surrounding building lines. Over cuts shall not be permitted unless approved by the ENGINEER.

3.5 CLEAN-UP

- A. The CONTRACTOR shall remove from the site all debris resulting from the demolition operations as it accumulates and at least 2 times a week. Upon completion of the immediate demolition work, the CONTRACTOR shall thoroughly clean each area, including dusting, vacuuming, sweeping, and window cleaning.

END OF SECTION 02 41 00

SECTION 02 41 16
STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. [Abandoning in-place] [Removing] below-grade construction.
3. Disconnecting, capping or sealing, and [abandoning in-place] [removing] site utilities.
4. Salvaging items for reuse by Owner.

B. Related Requirements:

1. Section 31 10 00 "Site Clearing and Demolition" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and [deliver to Owner ready for reuse] [store]. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at [Project site] <Insert location>.
- B. Inspect and discuss condition of construction to be demolished.
- C. Review structural load limitations of existing structures.
- D. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
- E. Review and finalize protection requirements.
- F. Review procedures for [noise control] [and] [dust control].
- G. Review procedures for protection of adjacent buildings.
- H. Review items to be salvaged and returned to Owner.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property[, for environmental protection, for dust control, for noise control. Indicate proposed locations and construction of barriers.
 - 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain [including means of egress from those buildings].
- D. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - 2. Temporary interruption of utility services.
 - 3. Shutoff and capping [or re-routing] of utility services.
- E. Pre-demolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. General Contractor shall coordinate and tour facilities prior to demolition with District staff to verify salvage items.
- B. General Contractor shall obtain from the District all record documents from District, not limited to drawings, so that they can familiarize themselves with the entirety of the scope of work.
- C. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- D. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- E. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before building demolition, Owner will remove the following items:
 - a. <Insert items to be removed by Owner>.
- F. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- G. Hazardous Materials: Present in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.

H. On-site storage or sale of removed items or materials is not permitted.

1.10 COORDINATION

A. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

2.2 SOIL MATERIALS

A. Satisfactory Soils: Comply with requirements in Section 31 20 00 "Excavating, Grading, and Site Preparation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

B. Salvaged Items: Comply with the following:

1. Clean salvaged items of dirt and demolition debris.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to storage area designated by Owner.
5. Protect items from damage during transport and storage.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.

1. Owner will arrange to shut off utilities when requested by Contractor.
2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
4. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.4 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

- a. Provide at least [72] <Insert number> hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated.
1. Protect adjacent buildings and facilities from damage due to demolition activities.
 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.5 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 2. Subsequent to flame cutting, maintain fire watch per number for duration as required by local Fire Marshal.
 3. Maintain adequate ventilation when using cutting torches.
 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.

2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Explosives: Use of explosives is not permitted.

3.6 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
- C. Salvage: Items to be removed and salvaged. Contractor shall conduct a pre-demolition meeting with District and arrange a site visit to survey items to be salvaged, protected and returned to owner.
- D. Below-Grade Construction: Abandon foundation walls and other below-grade construction. Cut below-grade construction flush with grade.
- E. Below-Grade Construction: Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending [5 feet (1.5 m)] <Insert dimension> outside footprint indicated for new construction. Abandon below-grade construction outside this area.
 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
- F. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
 2. Septic tanks shown on drawings to be removed shall be removed in their entirety including lid, vault walls and vault floor plate. Cap all inlet and discharge pipes attached to septic tank or reconnect as shown on drawings. Back fill hole as shown on drawings.
- G. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
- H. Hydraulic Elevator Systems: Demolish and remove elevator system, including cylinder, plunger, well assembly, steel well casing and liner, oil supply lines, and tanks.

3.7 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements.

- C. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.8 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.9 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site [and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.10 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
 - 1. Clean roadways of debris caused by debris transport.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMWORK

PART 1 - GENERAL

1.1. GENERAL REQUIREMENTS

- A. Requirements of Division 1 apply to all work of this section.

1.2. SCOPE

- A. Design, furnish and install forms for concrete as indicated on drawings and specified here. Remove forms and shores at specified time. Clean up.

1.3. RELATED WORK (See also Table of Contents)

- A. Reinforcing Steel: Section 03 21 00.
- B. Cast-In-Place Concrete: Section 03 30 00.
- C. Structural Steel: Section 05 12 00.
- D. Metal Fabrications: Section 05 50 00.
- E. Rough Carpentry: Section 06 10 00.
- F. Items relating solely to mechanical or electrical work are included under those Divisions, except as specifically indicated otherwise on Drawings.

1.4. QUALITY ASSURANCE

A. General:

- 1. Conform to all requirements of ACI 347 and ACI 318 Section 26.11.
- 2. Concrete formwork shall be designed and constructed to safely support fluid concrete and superimposed construction loads without excessive deflection or concrete leakage. Provide bracing to maintain accurate alignment and to resist all anticipated lateral loads. Forms shall conform with drawings as to shape, line, and dimension. Design, engineering and construction of forms shall be Contractor's responsibility. Formwork for exposed concrete shall be constructed to tolerances indicated in ACI 303R.
- 3. Cooperate and coordinate with other trades who furnish and/or install piping, conduit, reglets, anchors, inserts, sleeves, hangers, etc., as their work requires; including provisions for recesses and chases.

B. Submittals: (Submit under provisions of Section 01 33 00)

- 1. Product Data. Provide manufacturers data and installation instructions for the following:

- a. Tie rods and spreaders.
 - b. Formwork for exposed concrete.
 - c. Form coatings and release agents.
- C. Standards and References: (Latest Edition unless otherwise noted)
1. 2019 California Building Code (CBC) with State of California Amendments.
 2. American Concrete Institute (ACI).
 - a. ACI 303R - "Guide to Cast-In-Place Architectural Concrete Practice"
 - b. ACI 318 – "Building Code Requirements for Structural Concrete"
 - c. ACI 347R - "Guide to Formwork for Concrete"
 3. Standard Grading and Dressing Rules #17, West Coast Lumber Inspection Bureau (For Douglas Fir Form Lumber).
 4. U.S. Product Standard PS 1 (For Plywood Form Lumber).

PART 2 - PRODUCTS

2.1. MATERIALS

- A. Form Material:
1. Smooth Concrete exposed to view: 5/8 inch minimum APA Plyform or steel.
 2. Concrete concealed from view: 5/8 inch minimum APA Plyform, steel or clean and sound 1 x 8 Standard Grade Douglas Fir.
- B. Fiber Forms: Tubular column forms spirally constructed of laminated plies of fiber. Plies shall be laminated using a non-water sensitive adhesive and surface wax impregnated for moisture protection. Forms shall give a smooth and seamless appearance to the cast concrete. Provide reveals, as shown on the drawings, as supplied by the form manufacturer. Forms shall be as manufactured by Sonoco Products, plastic lined; Burke Smoothtube by Burke Co.; or approved equal.
- C. Form Clamps: Assembly to have cone washers, (1 inch break back) 3/8" inch center rod.
- D. Form Ties:
1. Concrete exposed to view: Snap ties allowing full 1 inch break back.
 2. Concrete concealed from view: Snap ties or wire.
 3. Verify special spacing requirements with architectural drawings at exposed concrete.

- E. Spreaders: Metal (no wood).
- F. Form Coating: Non-grain and non-staining types of form coating that will not leave a residual matter on the face of the concrete or adversely affect proper bonding of any subsequent paint or other surface applications.
 - 1. Form coating containing mineral oils or other non-drying materials will not be permitted for any concrete work.
- G. Joint Tape: No. 471 plastic film tape 3 inches wide, as manufactured by the Industrial Tape Division of 3M Company.
- H. Expansion Joint Filler (Preformed): ½ inch thick; Flexcell by Celotex Corporation, Elastic Fiber Expansion Joint by Phillip Carey Mfg. Co., or Sealtight Fiber Expansion Joint by W.R. Meadows, Inc.
- I. Extruded Polystyrene Foam: ASTM C578 type IV. Dow Chemical Corp. "Styrofoam", UC Industries "Foamular", or approved equal.

PART 3 - EXECUTION

3.1. FORM CONSTRUCTION

- A. Construct substantial forms to the shapes, lines, grades and elevations shown, sufficiently tight to prevent leakage of mortar, and tied, clamped and braced to prevent spreading, shifting or settling. Plywood joints shall be square and tight; plywood shall be arranged in such manner as to minimize number of joints and to provide a smooth, attractive finished concrete surface.
- B. Apply form coating to forms before reinforcing steel is in place.
- C. Sleeves, anchors and bolts, including those for angle frames, supports, ties and other materials in connection with concrete construction, shall be secured in position before the concrete is placed.
- D. Proper provisions shall be made for openings, blockouts, sleeves, offsets, sinkages, recesses and depressions required by other trades and suppliers prior to placing concrete.
 - 1. The Contractor shall also see that sleeves have been installed and other provisions have been made for the installation of mechanical, electrical and other equipment.
 - 2. Coordinate with all trades to insure proper placement of all items in forms and to provide proper blockouts wherever required.
- E. Concrete work out of alignment, level or plumb will be cause for rejection of the whole work affected and, if so rejected, such work shall be removed and replaced, as directed by Architect, with no additional cost to the Owner.
- F. Form Not Required: Concrete footings may be poured directly against cut earth where feasible and when the Architect's approval has been obtained.
 - 1. See structural drawings for requirements for placing concrete footings directly against earth without forms.

- G. Use $\frac{3}{4}$ inch minimum wood chamfer strips typical at all exposed corners unless noted otherwise on drawings.

3.2. CLEANING OF FORMS

- A. All dirt, chips, sawdust, rubbish, water, etc. shall be completely removed from form by water hosing and air pressure before any concrete is deposited therein. No wooden ties or blocking shall be left in concrete except where indicated for attachment of other work.
- B. Thoroughly clean and patch all holes in formwork and re-coat as required before reusing. Forms not suited to obtain concrete surfaces and tolerances in conformity with Contract requirements will be rejected by Architect.
 - 1. Reuse of forming materials shall be limited only as required to produce the finishes as specified, free from blemishes and other defects unless covered by other building materials in which case blemish free concrete is not required.

3.3. INSPECTION OF FORMS

- A. Notify the Architect at least 48 hours in advance of the beginning of pouring operations and at the completion of formwork and location of all construction joints. An inspection of forms and joints will be made for approval of finished work and general layout only. The foregoing inspection shall in no way relieve the Contractor of responsibility of design and safety or formwork, bulkheads and shorings.

3.4. REMOVAL OF FORMS AND SHORING

- A. Do not remove forms until concrete has attained sufficient strength to support its weight and any construction loading. Concrete must be allowed to cure long enough to avoid damage during form removal. Contractor or his representative in charge of concrete construction shall be present during removal of forms and shores, and shall be personally responsible for safety of this operation at all times and under all conditions.
- B. As a minimum, formwork and shoring shall remain in place for the following periods:
 - 1. Concrete on grade: 24 hours
 - 2. Walls and Columns: 3 days
 - 3. Formwork may be removed and reshores installed before the times indicated above, provided the concrete has cured sufficiently to avoid damage when formwork is removed. Shores must be immediately replaced with reshores in a sequence designed to avoid inducing stress in the concrete member.

3.5. ADJUSTING AND CLEANING

- A. Upon completion of this Work, clean up and remove from Site all equipment and debris resulting from this work.
- B. Surfaces to be painted shall be smooth and free of substances such as dirt, wax, excessive latence, grease or materials that would prevent proper bonding of finishes.

1. Removal of foregoing contaminants, and complete removal of parting and curing compounds affecting proper paint bond, shall be responsibility of this Section of Work. Sandblast cleaning shall not be employed without specific approval of Structural Engineer.

END OF SECTION 03 10 00

SECTION 03 21 00
REINFORCING STEEL

PART 1 - GENERAL

1.1. GENERAL REQUIREMENTS

- A. Requirements of Division 1 apply to all work of this Section.

1.2. SCOPE

- A. Unless noted otherwise, furnish and install reinforcing for all concrete, including dowels, chairs, spacers, bolsters, etc., necessary for supporting and fastening reinforcement in place as shown on the Drawings and specified herein.

1.3. RELATED WORK (See also Table of Contents)

- A. Concrete Formwork: Section 03 10 00.
- B. Cast-In-Place Concrete: Section 03 30 00.
- C. Concrete Unit Masonry: Section 04 22 00.

1.4. QUALITY ASSURANCE

A. General:

1. Acceptable Manufacturers: Regularly engaged in the manufacture of steel bar and welded wire fabric reinforcing.
2. Installer Qualifications: Installation shall be done only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics working under an experienced supervisor.
3. Welding Qualifications: Welding procedures, welding operators and welders shall be qualified in accordance with AWS D1.4 - "Structural Welding Code Reinforcing Steel".
 - a. Welders whose work fails to pass inspection shall be re-qualified before performing further welding.
4. Reinforcement Work shall conform to ACI 301 and ACI 318 Chapter 25, as minimum standards.
5. Allowable Tolerances:

- a. Fabrication:
 - 1) Sheared length: 1 inch.
 - 2) Depth of truss bars: Plus or minus ½-inch.
 - 3) Ties: Plus or minus ½-inch.
 - 4) All other bends: Plus or minus 1 inch.
- b. Placement:
 - 1) Concrete cover to form surfaces: Plus or minus ¼-inch.
 - 2) Minimum spacing between bars: Plus or minus ¼-inch.
 - 3) Crosswise of members: Spaced evenly within 2 inches of stated separation.
 - 4) Lengthwise of members: Plus or minus 2 inches.
- c. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 2 bar diameters.

B. Standards and References: (Latest Edition unless otherwise noted):

- 1. 2019 California Building Code (CBC) with State of California Amendments.
- 2. American Concrete Institute (ACI).
 - a. ACI 301 – “Specifications for Structural Concrete”
 - b. ACI 315R - "Guide to Presenting Reinforcing Steel Design Details".
 - c. ACI 318 – “Building Code Requirements for Structural Concrete”
- 3. American Society for Testing and Materials (ASTM).
 - a. ASTM A82 - "Cold Drawn Wire for Concrete Reinforcement".
 - b. ASTM A185 - "Welded Steel Wire Fabric for Concrete Reinforcement".
 - c. ASTM A615 - "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement".
 - d. ASTM A706 – “Low Alloy Steel Deformed Bars for Concrete Reinforcement”.
- 4. Concrete Reinforcing Steel Institute (CRSI) - "Manual of Standard Practice".
- 5. American Welding Standard (AWS).

- a. AWS D1.4 - "Structural Welding Code – Reinforcing Steel".

C. Submittals: (Submit under provisions of Section 01 33 00)

1. Shop Drawings: Prepare in accordance ACI 315R. Indicate bending diagrams, assembly diagrams, splicing and laps of bars and shapes, dimensions and details of bar reinforcing and assemblies. Correctness of all reinforcing requirements and work is the responsibility of Contractor. Identify such shop drawings with reference thereon to sheet and detail numbers from Contract Drawings.
 - a. Do not use scaled dimensions from Contract Drawings in determining the lengths of reinforcing bars.
 - b. No reinforcing steel shall be fabricated without approved shop drawings.
 - c. Any deviations from the contract documents must be clearly indicated as a deviation on the shop drawings.
 - d. Areas of high congestion, including member joints and embed locations shall be fully detailed to verify clearances and assembly parameters and coordination with other trades.
2. Certified mill test reports of supplied reinforcing indicating chemical and physical analysis. Tensile and bend tests shall be performed by the mill in accordance with ASTM A615.
3. Product Data:
 - a. Manufacturer's specifications and installation instructions for splice devices.
 - b. Bar Supports.
4. Certificates of Compliance with specified standards:
 - a. Reinforcing bars.
 - b. Welded wire fabric.
 - c. Welding electrodes.
5. Samples: Only as requested by Architect.

D. Tests and Inspections:

1. A testing program is required prior to start of construction. Testing program to be done in compliance with the CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.

2. All reinforcing steel whose properties are not identifiable by mill test reports shall be tested in accordance with ASTM A615. One Series of tests for each missing report to be borne by the Contractor.
3. When inspections are indicated for reinforcement placement on the Structural drawings, a special inspector shall be employed to inspect reinforcing placement per CBC Section 1704A.
4. When tests are indicated for reinforcing steel on the structural drawings, the reinforcing steel used shall be tested in accordance with ASTM A615. One tensile and one bend test for each 2-1/2 tons of steel or fraction thereof, shall be made.
5. Inspect shop and field welding in accordance with AWS D1.4, including checking materials, equipment, procedure and welder qualification as well as the welds. Inspector will use non-destructive testing or any other aid to visual inspection that he deems necessary to assure himself of the adequacy of the weld.
6. Tests and inspection shall be performed by Owners testing agency except when needed to justify rejected work, in which case the cost of retests and reinspection shall be borne by the Contractor.

1.5. PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.
- B. Handle and store materials to prevent contamination.
 1. Store reinforcement in a manner that will prevent excessive rusting or coating with grease, oil, dirt, and other objectionable materials. Storage shall be in separate piles or racks so as to avoid confusion or loss of identification after bundles are broken.
- C. Deliver and store welding electrodes in accordance with AWS D1.4.

PART 2 - PRODUCTS

2.1. MATERIALS

- A. Reinforcement Bars: ASTM A615, Grade 60 for all bars.
 1. Bar reinforcement to be welded shall meet chemical requirements of ASTM A706.
 2. Longitudinal reinforcement in columns and beams of special moment-resisting frames and special reinforced shear walls shall meet the chemical requirements of ASTM A706.
- B. Stirrups and Ties: ASTM A615, Grade 60 for all bars.

- C. Steel Dowels: Same grade as bars to which dowels are connected.
- D. Welded wire Fabric: ASTM A185.
- E. Tie Wires: FS-QQ-W-461, annealed steel, black, 16 gauge minimum.
- F. Welding Electrodes: AWS D1.4, low hydrogen, E70XX series.
- G. Bar Supports:
 - 1. Typical, unless noted otherwise; CRSI Class 2 wire supports.
 - a. Do not use wood, brick or other objectionable materials.
 - b. Do not use galvanized supports.
 - 2. Supports placed against ground: Pre-cast concrete blocks not less than 4 inches square with embedded wire.
- H. Mechanical Couplers: Comply with ACI 318 section 25.5.7.1.

PART 3 - EXECUTION

3.1. FABRICATION

- A. Shop fabricate reinforcement to meet requirements of Drawings.
- B. Fabricate reinforcement in accordance with the requirements of ACI 315R where specific details are not shown or where Drawings and Specifications are not more demanding.
- C. Steel reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the Drawings shall not be used. Heating of bars for bending will not be permitted.
- D. Reinforcing shall not be field bent or straightened without structural engineer's review.
- E. Provide offsets in rebar (1:6 maximum) where required to maintain clearances.

3.2. CONDITION OF SURFACES

- A. Examine surfaces and conditions receiving or affecting the work. Do not proceed until unsuitable conditions have been corrected.

3.3. GENERAL

- A. Concrete shown without reinforcing shall be reinforced as similar parts shown with reinforcing except where concrete is specifically noted to be unreinforced.

3.4. PLACEMENT

- A. All reinforcement shall be accurately set in place, lapped, spliced, spaced rigidly and securely held in place and tied with specified wire at all splices and crossing points. All wire tie ends shall point away from the form. Carefully locate all dowel steel to align with wall and column steel.
1. Bars shall be in long lengths with laps and splices as shown. Offset laps in adjacent bars. Place steel with clearances and cover as shown. Bar laps shall be as indicated on the Drawings. Tie all laps and intersections with the specified wire.
 2. Maintain clear space between parallel bars not less than 1-1/2 times nominal diameter, but in no case shall clear space be less than 1-1/2 times maximum size concrete aggregate.
 3. Reinforcing dowels for slabs shall be placed as detailed. Sleeves may be used if reviewed by the Structural Engineer before installation. Install dowel through all construction and expansion joints for all slabs on grade.
- B. Bar Supports: Support and securely fasten bars with chairs, spacers and ties to prevent displacement by construction loads or placement of concrete beyond the tolerances specified. Conform to CRSI as a minimum standard.
- C. Steel Adjustment:
1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
 2. Do not move bars beyond allowable without concurrence of Structural Engineer and DSA.
 3. Do not heat, bend, or cut bars without concurrence of Structural Engineer and DSA.
 4. Reinforcement shall not be bent after being embedded in hardened concrete.
- D. Splices:
1. Splice reinforcing as shown.
 2. Lap Splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
 3. Splice Devices: Install in accordance with manufacturer's written instructions. Obtain Structural Engineer's review and DSA approval before using.
 4. Do not splice bars except at locations shown without concurrence of Structural Engineer and DSA.

- a. Where splices in addition to those indicated are required, indicate location on shop drawings clearly and highlight "for Engineer's approval".
- E. Welding:
1. Welding is not permitted unless specifically detailed on Drawings or approved by Engineer and DSA.
 2. Employ shielding metal-arc method and meet requirements of AWS D1.4.
 3. Welding is not permitted on bars where the carbon equivalent is unknown or is determined to exceed 0.55.
 4. Welding shall not be done within two bar diameters of any bent portion of a bar which has been bent cold.
 5. Welding of crossing bars is not permitted.
- F. Welded Wire Fabric: Install in long lengths, lapping 24 inches at end splices and one mesh at side splices. Offset laps in adjacent widths. Place fabric in approximately the middle of the slab thickness unless shown otherwise on the Drawings by dimension. Wire tie lap joints at 12-inch centers. Use concrete blocks to support mesh in proper position.
- G. Reinforcement shall be free of mud, oil or other materials that may reduce bond at the time concrete is placed. Reinforcement with tightly adhered rust or mill scale will be accepted without cleaning provided that rusting has not reduced dimensions and weights below applicable standards. Remove loose rust.
- H. Protection against rust:
1. Where there is danger of rust staining adjacent surfaces, wrap reinforcement with impervious tape or otherwise prevent rust staining.
 2. Remove protective materials and clean reinforcement as required before proceeding with concrete placement.
- I. Drawing Notes: Refer to notes on Drawings for additional reinforcement requirements.
- J. Mechanical and Electrical Drawings: Refer to Mechanical and Electrical Drawings for formed concrete requiring reinforcing steel. All such steel shall be included under the work of this Section.

END OF SECTION 03 21 00

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1. GENERAL REQUIREMENTS

- A. Requirements of Division 1 apply to all Work of this Section.

1.2. SCOPE

- A. Furnish, place and finish cast in place concrete and related work as indicated on the Drawings and specified here.
 - 1. Install miscellaneous metal and other items furnished by other trades to be installed in concrete work.
 - 2. Provide facilities for job curing of test cylinders and transporting to Testing Laboratory.
- B. Provide grouting of steel base plates as indicated on the Drawings and specified here.

1.3. RELATED WORK (See also Table of Contents)

- A. Concrete Formwork: Section 03 10 00.
- B. Reinforcing Steel: Section 03 21 00.
- C. Mortar and Grout: 04 05 00.
- D. Structural Steel: Section 05 12 00.
- E. Metal Decking: Section 05 30 00.
- F. Metal Fabrications: Section 05 50 00.

1.4. QUALITY ASSURANCE

- A. Standards and References: (Latest Edition unless otherwise noted)
 - 1. 2019 California Building Code (CBC), with State of California Amendments.
 - 2. American Concrete Institute (ACI)
 - a. ACI 117 – “Specification for Tolerances for Concrete Construction and Materials”
 - b. ACI 211.1 – “Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete”

- c. ACI 211.2 – “Standard Practice for Selecting Proportions for Structural Lightweight Concrete”
 - d. ACI 301 – “Specifications for Structural Concrete”
 - e. ACI 302.1R – “Guide to Concrete Floor and Slab Construction”
 - f. ACI 305R – “Guide to Hot Weather Concreting”
 - g. ACI 306R – “Guide to Cold Weather Concreting”
 - h. ACI 318 – “Building Code Requirements for Structural Concrete”
 - i. ACI 360R – “Guide to Design of Slabs-On-Ground”
3. American Society for Testing and Materials (ASTM)
- a. ASTM C31 – “Making and Curing Concrete Test Specimens in the Field”
 - b. ASTM C33 – “Concrete Aggregates”
 - c. ASTM C39 – “Compressive Strength of Cylindrical Concrete Specimens”
 - d. ASTM C42 – “Obtaining and Testing Drilled Cores and Sawed Beams of Concrete”
 - e. ASTM C94 – “Ready-Mixed Concrete”
 - f. ASTM C109 – “Test of Hydraulic Cement Concrete”
 - g. ASTM C143 – “Slump of Hydraulic Cement Concrete”
 - h. ASTM C150 – “Portland Cement”
 - i. ASTM C172 – “Sampling Freshly Mixed Concrete by the Volumetric Method”
 - j. ASTM C192 – “Making and Curing Concrete Test Specimens in the Laboratory”
 - k. ASTM C260 – “Air-Entraining Admixtures for Concrete”
 - l. ASTM C330 – “Lightweight Aggregates for Structural Concrete”
 - m. ASTM C494 – “Chemical Admixtures for Concrete”
 - n. ASTM C618 – “Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete”
 - o. ASTM C685 – “Volumetric Batching and Continuous Mixing”
 - p. ASTM C1157 – “Hydraulic-Cement”
- B. Submittals: (Submit under provisions of Section 01 33 00)

1. Concrete mix designs. See “Mix Design” below. Include results of test data used to establish proportions.
 2. Certificates of Compliance from Manufacturer
 - a. Cement per CBC Section 1913A.1. Cement without certificate shall not be used.
 - b. Aggregates
 - c. Admixtures.
 3. Data regarding hardeners and sealers.
 4. Grout samples for sacked surface textures and colors upon Architects request only.
 5. Layout drawings for construction, control and expansion joints.
 6. Transit-mix delivery slips:
 - a. Keep record at the job site showing time and place of each pour of concrete, together with transit-mix delivery slips certifying contents of the pour.
 - b. Make the record available to the Architect for his inspection upon request.
 - c. Upon completion of this portion of the work, deliver the record and the delivery slips to the Architect.
 7. See Section 03 21 00 for reinforcing steel submittals.
- C. Tests and Inspections:
1. Provide special inspections and testing as described in the “Statement of Structural Special Inspections and Testing” within the structural drawings and as required by this section.
 2. A testing program is required prior to start of construction. Testing program to be done in Compliance with the CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
 3. The following tests shall be made by a recognized testing laboratory selected by the Owner and approved by the governing agency. All tests shall be in accordance with the previously mentioned standards and CBC Section 1903A.2, Chapter 17A and Section 1910A. A complete record of all tests and inspections shall be kept per CBC Section 1910A.
 - a. Compressive Strength: Make and cure in accordance with ASTM C-31. Test in accordance with ASTM C-39 and ACI Section 26.12.
 - 1) A record shall be made of time and of locations of concrete from which samples were taken.

- 2) Four identical cylinders shall be taken from each pour of 50 cubic yards or 2000 square feet or part thereof, being placed each day per ACI 318 Section 26.12.2. One cylinder shall be tested at age 7 days, and two at age 28 days unless otherwise specified. Preserve remaining cylinder for future use.
- b. Drying Shrinkage: (applies to lightweight concrete only unless noted otherwise)
- 1) A record shall be made of time cylinders and of locations of concrete from which samples were taken.
 - 2) Three identical 4" x 4" x 11" specimens shall be made from same concrete as used in structure. Percent of shrinkage shall be reported at 21 days after 7 day moist curing period. Average results of 3 specimens shall be used as the accepted value. The value for laboratory cast specimens shall not exceed .075%. If field test specimens are used in lieu of laboratory specimens, a tolerance of +33% may be used.
 - 3) Test specimens in accordance with ASTM C157.
- c. Concrete consistency (slump) shall be tested in accordance with ASTM C143.
4. Provide full time inspection per CBC Section 1704A.3 during the taking of test specimens and during the placing of all concrete and embedded steel.
 5. See Section 03 21 00 for reinforcing steel tests and inspections.
 6. Provide concrete batch plant inspections per CBC Section 1705A.3.2.

PART 2 - PRODUCTS

2.1. MATERIAL

- A. Portland Cement: ASTM C 150, Type II or Type V. One brand of cement shall be used throughout to maintain uniform color for all exposed concrete.
- B. Concrete Aggregate: Fine and coarse aggregates shall be regarded as separate ingredients. Each size of coarse aggregate, as well as combination of sizes when two or more are used, shall conform to grading requirements of appropriate ASTM Standards and CBC Section 1903A.6.
 1. Concrete Aggregates for Standard Weight Concrete: ASTM C 33. Aggregate shall be crushed granite or Perkins type.
 2. Concrete Aggregates for Lightweight Concrete: ASTM C330 to produce concrete weighing no more than 116 pcf at 28 days. Aggregate shall be vacuum saturated expanded shale as produced through the rotary kiln method.
- C. Water: Clean and free from injurious amounts of oil, acids, alkali, organic matter and other deleterious substances; suitable for domestic consumption.
- D. Admixtures shall be subject to prior approval by the Engineer, in accordance with ACI 318 Section 26.4.1.4. Calcium Chloride is not permitted.

1. Water Reducing
 - a. ASTM C494 Type A - for use in cool weather.
 - b. ASTM C494 Type D - for use in hot weather.
 2. Air Entraining
 - a. Conform to ASTM C 260
 3. Fly Ash
 - a. Conform to ASTM C 618
 4. Mid-Range Water-Reducers
 - a. Master Builders “Polyheed” or approved equal.
 5. Fly Ash Pozzolan
 - a. Conforming to ASTM A-618 Class F
- E. Slab on Grade Vapor Retarder
1. Vapor Retarder must have the following qualities:
 - a. 15 mil thickness minimum
 - b. WVTR less than 0.008 as tested by ASTM E 96
 - c. ASTM E 1745 Class A (Plastics)
 2. Vapor Retarder Products
 - a. Stego Wrap Vapor Retarder by STEGO Industries LLC.
 - b. Perminator by W.R. Meadows.
 3. Vapor Retarder Tape
 - a. Water Vapor Transmission Rate: ASTM E 96, 0.3 perms or lower
 - b. Minimum 6-mils thick
 - c. Minimum 3 3/4 inches wide
 - d. Manufactured from High Density Polyethylene
 - e. Pressure Sensitive Adhesive
- F. Sand: Clean, dry, well graded.

- G. Abrasive aggregate for non-slip finish: Fused aluminum oxide grits, graded 12/30. Use factory-graded rustproof and non-glazing material that is unaffected by freezing, moisture and cleaning materials.
 - 1. Products offered by manufacturers to comply with the above requirements include: A-H Alox; Anti-Hydro Waterproofing Co., Toxgrip; Toch Div. - Carboline, or approved equal.
- H. Expansion Joint Filler:
 - 1. Joint fill shall be a preformed non-extruded resilient filler, saturated with bituminous materials and conforming to ASTM D 1751. Products shall be equivalent to Burke "Fiber Expansion Joint", W.R. Meadows "Fibrated Expansion Joint Filler", or approved equal.
- I. Bonding Agent: Sonneborn "Sonobond"; the Euclid Chemical Company "Euco-Weld"; Larsen Products Corp., "Weld-Crete" or approved equivalent.
- J. Concrete Sealer: Cure and Seal, as manufactured by the Euclid Chemical Company "Aqua-Cure VOX", Sonneborn "Kure-N-Seal WB", Burke "Spartan-Cote", W.R. Meadows "Intex" or approved equal conforming to ASTM C-309, Type I, Class B requirements, and conforming to State of California Air Resources Board VOC Regulations.
- K. Concrete Hardener/Sealer: Clear, water soluble, sprayable in-organic silicate based hardener/sealer or acrylic co-polymer resin. Products shall be equal to Euclid Chemical Company "Eucosil", Burke "Spartan-Cote", Sonneborn "Sonosil", W.R. Meadows "Pena-Lith", or approved equal and must conform to State of California Air Resources Board VOC Regulations.
- L. Concrete Cure: Water based curing compound conforming to ASTM C-309, Type 1, Class A and B, and AASHTO Specification M-148; Type 1, Class A and B requirements, and State of California Air Resources Board VOC Regulations. Product shall be equivalent to Euclid Chemical Company "Kurez VOX", Burke "No. 1127" or "Aqua-Resin Cure", W.R. Meadows "1100 Clear", or approved equal.
- M. Non-Shrink Grout: See Section 2.2.A.6.

2.2. CONCRETE

A. Concrete Mixes:

- 1. Type A Concrete:
 - Strength: 3000 lbs. per square inch at 28 days.
 - Maximum Aggregate Size: 1-1/2 inch.
 - Cement Content: As required by mix design (ACI Section 26.4.3).
 - 5.0 sacks per yard minimum.
 - Maximum Water to Cement Ratio: 0.58
 - Admixture: Water Reducing.
 - Weight: 145 lbs. per cubic foot

Use for unexposed foundation concrete except as otherwise specified. At Contractor's option, Type B concrete may be substituted for this.
- 2. Type B Concrete:
 - Strength: 3500 lbs. per square inch at 28 days.
 - Maximum Aggregate Size: 1 inch.
 - Minimum Cement Content: As required by mix design (ACI Section 26.4.3).

5.5 sacks per yard minimum.
Maximum Water to Cement Ratio: 0.45
Admixture: Water reducing.
Weight: 145 lbs. per cubic foot
Use for building slab on grade

3. Type C Concrete:

Strength: 3500 lbs. per square inch at 28 days.
Maximum Aggregate Size: 3/4 inch.
Minimum Cement Content: As required by mix design (ACI Section 26.4.3).
6.0 sack per cubic yard minimum.
Maximum Water to Cement Ratio: 0.52
Admixture: Water reducing.
Weight: 145 lbs. per cubic foot
Use for normal weight concrete over metal deck

4. Grout shall be non-shrink, non-metallic, flowable Type "713" or "928" by BASF.

- a. Metallic grout equivalent to Master Builders "Embeco" may be used only where covered by earth, concrete, or masonry.
- b. Acceptance by Architect required before using.

B. Consistency of Concrete: Concrete slump, measured in accordance with ASTM C 143, shall fall within following limits.

1. For General concrete placement (with no admixtures): 4 inch plus or minus 1 inch.
2. Mixes employing the specified mid-range water reducer shall provide a measured slump not to exceed 7 inch \pm 1 inch after dosing, 2 inch \pm 1 inch before dosing.
3. Concrete slump shall be taken at point of placement. Use water reducing admixtures as required to provide a workable consistency for pump mixers. Water shall not be added at the jobsite without written review by the structural engineer.

C. Mix Design:

1. Initial mix designs shall be prepared for all concrete in accordance with ACI 318 Section 26.4.3 by recognized testing laboratory (approved by Architect). Mix proportions shall be determined in accordance with ACI Section 26.4.3 or 26.4.4. In the event that additional mix designs are required due to depletion of aggregate sources, aggregate not conforming to Specifications, or at request of Contractor, these mixes shall be prepared as above.
2. Contractor shall notify the Testing Laboratory and Architect of intent to use concrete pumps to place concrete so that mix designs can be modified accordingly.
3. Fly ash shall not exceed 25% of the total cementitious material.
4. Provide 6% air entrainment typical for mixes exterior concrete to freeze-thaw cycles.
5. Owner's testing laboratory shall review all mix designs before submittal. A registered civil engineer with experience in concrete mix design shall review the concrete mixes.

D. Mixing:

1. Equipment: All concrete shall be machine mixed. Provide adequate equipment and facilities for accurate measurement and control of materials.
2. Method of Mixing:
 - a. Transit Mixing: Comply with ASTM C 94. Ready mixed concrete shall be used throughout, except as specified below.
 - b. On-Site Mixing: Use only if method of storing material, mixing of material and type of mixing equipment is approved by Architect. Approval of site mixing does not relieve Contractor of any other requirements of Specifications.
 - c. Mixing shall be in accordance with ASTM C94 or ASTM C685.
3. Mixing Time: After mix water has been added, concrete shall be mixed not less than 1-1/2 minutes nor more than 1-1/2 hours. Concrete shall be rejected if not deposited within the time specified.
4. Admixtures:
 - a. Air entraining and chemical admixtures shall be charged into mixer as a solution and shall be dispensed by an automatic dispenser or similar metering device. Powdered admixtures shall be weighed or measured by volume as recommended by manufacturer. Accuracy of measurement of any admixture shall be within plus or minus 3%.
 - b. Two or more admixtures may be used in same concrete, provided such admixtures are added separately during batching sequence, and provided further that admixtures used in that combination retain full efficiency and have no deleterious effect on concrete or on properties of each other.
 - c. All admixtures are to be approved by Structural Engineer prior to commencing this work.
5. Retempering:
 - a. Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall be discarded, not retempered.
 - b. Indiscriminate addition of water to increase slump is prohibited.

- c. When concrete arrives at project with slump below that suitable for placing, water may be added only if neither maximum permissible water-cement ratio nor maximum slump is exceeded. Water shall be incorporated by additional mixing equal to at least half of total mixing time required. Any addition of water above that permitted by limitation of water-cement ratio shall be accompanied by a quantity of cement sufficient to maintain proper water-cement ratio. Such additions shall only be used if approved by Architect. In any event, with or without addition of cement, not more than 2 gallons of water per cubic yard of concrete, over that specified in design mix, shall be added.
6. Cold Weather Batching: When average of the highest and lowest air temperature falls below 40 degrees F for more than three consecutive days, provide adequate equipment for heating concrete materials. No frozen materials or materials containing ice shall be used. When placed in forms, concrete placed in these temperatures shall have a minimum temperature based on dimensions of concrete sections placed per ACI 301.
7. Hot Weather Batching: Concrete deposited in hot weather shall have a placing temperature below 90 degrees F per ACI 301. If necessary, ingredients shall be cooled to accomplish this.

2.3. FLOOR LEVELING AND FILL MATERIALS

- A. Epoxy Concrete Mortar: Floor leveling, non-shrink trowel applied epoxy concrete mortar; TPM 115 General Polymers Corp., A-H Emery Epoxy Topping #170 Anti-Hydro Corp., or approved equal, where areas to fill are less than 1/4 inch thick.
- B. Concrete Mortar: Floor leveling, patching and repair, non-shrink trowel applied concrete mortar; Master Builders EMBECO 885, Euclid EUCO, or approved equal, where areas of fill are greater than 1/4 inch thick.
- C. Cementitious Floor Leveling Material: Shall be self-leveling or trowelable with a minimum 28 day compressive strength of 3000 psi in accordance with ASTM C-109. Material shall be equal to Quikrete No. 1249, Ardex V-800/K-55, Mapei "Ultra/Flex" or approved equal.

PART 3 - EXECUTION

3.1. PLACEMENT

- A. Before any concrete is placed, the following items of work shall have been completed in the area of placing.
 1. Forms shall have been erected, adequately braced, cleaned, sealed, lubricated if required, and bulkheaded where placing is to stop.
 2. Any wood forms other than plywood shall be thoroughly water soaked before placing any concrete. The wetting of forms shall be started at least 12 hours before concreting.
 3. Reinforcing steel shall have been placed, tied and supported.

4. Embedded work of all trades shall be in place in the forms and adequately tied and braced.
 5. The entire place of deposit shall have been cleaned of wood chips, sawdust, dirt, debris, hardened concrete and other foreign matter. No wooden ties or blocking shall be left in the concrete except where indicated for attachment of other work.
 6. Reinforcing steel, at the time the concrete is placed around it, shall be cleaned of scale, mill scale or other contaminants that will destroy or reduce bond.
 7. Concrete surfaces to which fresh concrete is to be bonded shall be brush cleaned to remove all dust and foreign matter and to expose the aggregate, and then coated with the bonding adhesive herein specified.
 8. Prior to placing concrete for any slabs on grade, the moisture content of the subgrade below the slabs shall be adjusted to at least optimum moisture.
 9. No concrete shall be placed until formwork and reinforcement has been approved by Architect. Clean forms of all debris and remove standing water. Thoroughly clean reinforcement and all handling equipment for mixing and transporting concrete. Concrete shall not be placed against reinforcing steel that is hot to the touch. Notify Structural Engineer 48 hours in advance of concrete pour.
- B. Conveying: Handle concrete from mixer to place of final deposit by methods which will prevent separation or loss of ingredients. Deposit concrete in forms as nearly as practicable at its final position in a manner which will insure that required quality is obtained. Chutes shall slope not less than 4 inches and not more than 6 inches per foot of horizontal run.
- C. Depositing: Deposit concrete into forms in horizontal layers not exceeding 24 inches in thickness around building, proceeding along forms at a uniform rate and consolidating into previous pour. In no case shall concrete be poured into an accumulation of water ahead of pour, nor shall concrete be flowed along forms to its final place of deposit. Fresh concrete shall not be permitted to fall from a height greater than 6 feet without use of adjustable length pipes or, in narrow walls, of adjustable flexible hose sleeves. Concrete shall be scheduled so that placing is a continuous operation for the completion of each section between predetermined construction joints. If any concreting operation, once planned, cannot be carried on in a continuous operation, concreting shall stop at temporary bulkheads, located where resulting construction joints will least impair the strength of the structure. Location of construction joints shall be as shown on the drawings or as approved by Structural Engineer and DSA. The rate of rise in walls shall not be less than 2 feet per hour.
1. Consolidation: Concrete shall be thoroughly compacted and worked to all points with solid continuous contact to forms and reinforcement to eliminate air pockets and honeycombing. Power vibrators of approved type shall be used immediately following pour. Spading by hand, hammering of forms or other combination of methods will be allowed only where permitted by Structural Engineer. In no case shall vibrators be placed against reinforcing steel or used for extensive shifting of deposited fresh concrete. Provide and maintain standby vibrators, ready for immediate use.

2. Hot Weather Concreting: Unless otherwise directed by the Architect, perform all work in accordance with ACI 305 when air temperature rises above 75 degrees F and the following:
 - a. Mixing Water: Keep water temperature as low as necessary to provide for the required concrete temperature at time of placing. Ice may be required to provide for the design temperature.

Aggregate: Keep aggregate piles continuously moist by sprinkling with water.

Temperature of Concrete: The temperature of the concrete mix at the time it is being placed in the forms shall not exceed 90 degrees F per ACI 301. The method employed to provide this temperature shall in no way alter or endanger the design mix or the design strength required.

Dampen subgrade and formwork before placing concrete. Remove all excess water before placing concrete. Keep concrete continuously wet when air temperature exceeds 85 degrees F for a minimum of 48 hours after placing concrete. For slab on grade construction, see Section 3.1.E.

Protection: Minimize evaporation from concrete in place by providing shade and windbreaks. Maintain such protection in place for 14 days minimum.

3. Cold Weather Concreting: Follow recommended ACI 306 procedures when average of the highest and lowest air temperature falls below 40 degrees F for more than three consecutive days, as approved by Architect. Concrete placed in these temperatures shall have a minimum temperature based on dimensions of concrete sections placed as shown in ACI 301. No chemicals or salts shall be used to prevent freezing and no accelerating agents shall be used without prior approval from Architect.
- D. Construction Joints: Install only as indicated and noted on Drawings. Joints not indicated on Drawings shall be so located, when approved, as to least impair strength of structure, and shall conform to typical details. Construction joints shall have level tops, vertical sides. Horizontal construction joints shall be thoroughly cleaned and roughened by removing entire surface film and exposing clean aggregate solidly embedded in mortar matrix. Joints between concrete and masonry shall be considered construction joints. Vertical construction joints need not be roughened. See Drawings for doweling and required keys.
1. Roughen construction joints by any of following methods:
 - a. By sandblasting joint.
 - b. By thoroughly washing joint, using a high pressure hose, after concrete has taken initial set. Washing shall be done not less than 2 hours nor more than 4 hours after concrete has been poured, depending upon setting time.
 - c. By chipping and wire brushing.

2. All decisions pertaining to adequacy of construction joint surfaces and to compliance with requirements pertaining to construction joints shall be reviewed with the Structural Engineer.
3. Just before starting new pour, horizontal and vertical joint surfaces shall be dampened (but not saturated).
4. Before placing regular concrete mix, horizontal construction joint surfaces shall be covered with a layer of mortar composed of cement and fine aggregate of same proportions as that used in prescribed mix, but omitting coarse aggregate.
5. For slabs, construction joints shall be in locations shown on plan. If not shown, locate at intervals not exceeding 150 feet in each direction. Refer to drawings for proper details for reinforcing at construction joints.

E. Concrete Slabs on Grade:

1. Exterior and interior concrete slabs on grade shall be poured as required under this Section. Base shall be accurately leveled and compacted prior to placing of concrete.
2. Typically, interior slabs on grade shall be poured over a minimum of four (4 inch) inches of compacted crushed rock, unless otherwise indicated, over a vapor retarder.
3. Protect slab on grade subbase from moisture prior to placing concrete. Avoid wetting rock layer to allow adequate concrete curing and avoid future vapor transmission. If the subbase has been wet excessively, verify that water has been eliminated prior to placement of concrete.
4. Vapor Retarder installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
 - a. Unroll Vapor Retarder with the longest dimension parallel with the direction of the pour.
 - b. Lap Vapor Retarder over footings and seal to foundation walls.
 - c. Overlap joints 6 inches and seal with specified tape.
 - d. Seal all penetrations (including pipes) per manufacturer's instructions.
 - e. No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by cutting patches of Vapor Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

F. Control Jointing - Slabs on Grade:

1. Joints shall be in locations indicated on Drawings, or as directed by Architect.
2. Joints in interior slabs shall be made by one of following methods:

- a. By use of construction joints laid out in checkerboard pattern; pour and allow alternate slabs to set; fill out balance of checkerboard pattern with second pour.
 - b. By use of dummy groove joints at least 1/4 depth of slab, and at least 1/8 inch wide. These joints may be sawcut as soon as wet concrete can support the weight of the equipment and operator. Delaying sawcutting past this point will make jointing ineffective.
3. Control jointing in exterior paving slabs shall be laid out in a checkerboard pattern; pour as described above, but with joint edges tooled to provide a uniform joint at least 3/8 inch in depth.
 4. Slab reinforcing need not be terminated at control joints.
 5. Construction and expansion joints shall be counted as control joints.
- G. Expansion Joints:
1. Unless otherwise indicated, use 3/8 inch thick expansion joint filler. See Section 2.1.H.
 2. Joints in interior slabs on grade shall be only in locations indicated.
 3. Joints in exterior slabs on grade shall be installed at each side of structures, at curb transitions opposite apron joints, at ends of curb returns, at back of curb when adjacent to sidewalk, and at uniformly spaced intervals not exceeding 20 feet.
 4. Edges of concrete at joints shall be edger finished to approximately 3/8 inch radius.
 5. Interrupt reinforcing at all expansion joints.
- H. Score markings on exterior slabs on grade shall be located as indicated. Where not indicated, mark slabs into rectangles of not less than 12 square feet nor more than 20 square feet using a scoring tool which will leave edges of score markings rounded.

3.2. CURING AND PROTECTION

- A. Curing: Exposed surfaces of all concrete used in structure shall be maintained in a moist condition for at least 7 days after placing. The following final curing processes shall normally be considered to accomplish this. Concrete shall be maintained at not less than 50 degrees F nor more than 100 degrees F for a period of 72 hours after being deposited.
1. Flatwork to be exposed, stained, or painted shall have curing process submitted and approved by the architect prior to construction
 2. Initial Curing Process - Flat Work:

- a. **Mist Spraying:** As soon as troweling of concrete surfaces is completed, exposed concrete shall be sprayed continuously with a special atomizer spray nozzle, capable of producing a fine mist. Spraying shall be done without any dripping of water from nozzle. Amount of spraying shall be such as to maintain surface of concrete moist without any water accumulating on surface. Maintain spraying for a minimum of 12 hours, or until such time as hereinafter described curing process is applied. Mist spraying will not normally be required when the ambient air temperature is below 90 degrees F.
3. **Final Curing Process - Flatwork:** Except as noted, use any of following:
 - a. **Water Curing:** Concrete shall be kept wet by mechanical sprinklers or by any other approved method which will keep surfaces continuously wet.
 - b. **Saturated Burlap Curing:** Finished surfaces shall be covered with a minimum of two layers of heavy burlap which shall be kept saturated during the curing period.
 - c. **Curing Compounds:** Membrane curing compounds of chlorinated rubber or resin type conforming to ASTM C309 may be used only if specifically approved by Architect. Use of membrane curing compound will not be permitted on surfaces to be painted, or to receive ceramic tile, membrane water-proofing or hardeners and sealers. Membrane curing compound may be used in areas to receive resilient floor tile, provided it is wax-free, compatible with adhesive used and approved by adhesive manufacturer. Agitate curing compounds thoroughly by mechanical means continuously during use and spray or brush uniformly in accordance with manufacturer's recommendations. Apply immediately following final finishing operation. All curing compounds shall conform to State of California Air Resources Board VOC Regulations.
 - d. **Waterproof paper** conforming to ASTM C 171, or opaque polyethylene film, may be used. Concrete shall be covered immediately following final finishing operation. Anchor paper or film securely and seal all edges in such a manner as to prevent moisture escaping from concrete.
 4. **Curing Process - Formed Surfaces:** Forms heated by sun shall be kept moist during curing period. If forms are to be removed during curing period, curing as described for flatwork shall be commenced immediately.
- B. Refer to Drawings for areas of concrete slab not to receive curing compounds or hardening compounds. Where concrete floors are to receive heavy duty coatings, waterproof coatings and the like, verify with coating installer the type of finish required for specified coating.
 - C. **Protection:** Contractor shall be responsible for protection of finished concrete against injury by rain, cold, vibration, animal tracks, marking by visitors, vandalism, etc.
 - D. Provide additional curing agents or compounds, not necessarily listed herein, but as recommended and or required for use with shake type hardeners or other special coatings and coverings by their manufacturers for a complete and proper installation.

3.3. FINISHES

A. Formed Surfaces:

1. Rough Form Finish: Surfaces shall be reasonably true to line and plane with no specified requirements for selected facing materials. Tie holes and defects shall be patched and fins exceeding 1/4 inch in height shall be rubbed down with wooden blocks. Fins and other rough spots at surfaces to receive membrane waterproofing shall be completely removed and the surfaces rubbed smooth. Otherwise, surfaces shall be left with the texture imparted by forms.
 - a. Rough finish shall be used for the following areas:
 - 1) Below grade and unexposed surfaces.
2. Smooth Plywood Form Finish: Finish shall be true to line and plane. Tie holes and defects shall have been patched and ground with surface fins removed. Arrangement of plywood sheets shall be orderly, symmetrical, as large as practical and free of torn grain or worn edges. Surface concrete shall be treated with 1 part muriatic acid, in three parts water solution, followed immediately by a thorough rinsing with clear water. Surfaces which are glazed, have efflorescence, or traces of form oil, curing compounds or parting compounds shall be cleaned or treated to match other formed surfaces, except as otherwise indicated or specified.
 - a. Smooth Plywood Form Finish shall be used for the following areas:
 - 1) All surfaces above grade unless otherwise specified.
 - 2) At Contractor's option, may also be used in lieu of rough form finish.
3. Smooth Plastic Liner Finish: Surface shall be smooth, concrete free of honeycombing, air pockets larger than 1/8 inch in diameter, and fins.
 - a. This finish shall be used only where indicated on the Drawings.

B. Flatwork (Slabs and Floors):

1. Unless otherwise indicated or specified, flatwork shall have an integral monolithic finish.
2. Integral Monolithic Finish: Apply as soon as freshly poured concrete slabs will bear weight of workers. Pour slabs full thickness to finish floor elevations indicated. At proper time, tamp surface repeatedly with a wire mesh or grid tamper in a manner to force aggregate down below surface and to bring sufficient mortar to surface to provide for a smooth coating of cement mortar over entire surface. Allow surface mortar to partially set, then float with wooden floats and finish with one of following, as required.
 - a. Broom Finish: Steel trowel surface to a smooth dense surface free of lines, tool marks, cat faces and other imperfections. After troweling, and before final set, give surface a broom finish, brushing in direction noted on Drawings, or as directed. Broom finish shall be used typically on exterior flatwork except as otherwise indicated or specified and shall be "medium" texture as approved by Architect.

- b. Smooth Steel Trowel Finish: Apply 2 steel trowelings to obtain hard, smooth surface. All lips, irregularities, uneven levels, etc. shall be worked out before last troweling. All interior flatwork shall have a smooth steel trowel finish unless specified otherwise.
3. Tolerances:
 - a. For tolerances not indicated, refer to ACI 117.
 - b. Slabs on grade – Comply with F_F & F_L as specified by Architect, or at a minimum shall be sufficiently even to contact a 10' long straightedge with a tolerance of 1/8 inch.
 - c. Concrete over metal deck – Refer to Section 05 30 00 for minimum requirements.
 - d. Elevated slabs – Comply with Architectural requirements.
 - e. Finished surfaces of exterior integral finished flatwork shall not vary more than 1/4 inch from a 10' long straightedge, except at grade changes.
- C. Sacked Surfaces: Exposed surfaces that are unacceptable in appearance to the Architect shall be sacked.
1. Prepare concrete surfaces in accordance with the referenced standards. Remove any form release materials by stoning by hand, power grinding or other method approved by the Architect.
 2. Prepare concrete surfaces to receive sack finishing with a light sand blasting.
 3. For best results, grout application and rubbing should be performed when areas to be treated are shaded and during cool, damp weather. When work is to be performed in hot and dry weather, a fog spray should be available for continuous use.
 4. Prepare grout samples for matching of concrete surfaces for approval by the Architect. These shall be made in the following proportions of gray cement to white cement to sand: 1:1:2, 1:2:3, and 2:1:3, etc. until the correct matching color is obtained on the test areas. Sand should be fine enough to pass the Number 30 sieve. Mixes should be made to a good workable consistency in a clean container and the mix with the best color chosen, or modified if needed.
 5. Provide sufficient quantities of sand and cement from the same source for the complete work at the job site.
 6. Mixing and Application:
 - a. Mixing of grout on the job should be timed for it to be used up within 1 to 1-1/2 hours.
 - b. Let the grout stand 20 to 30 minutes after mixing, and then remixed before applying.
 - c. Soak the concrete surface thoroughly with water at least 15 minutes before applying grout and again just before application so that the surface is adequately wet during the operation.

- d. Apply grout with plasterer's trowel or sponge rubber float in sweeping strokes from the bottom up. Brush or spray gun applications may be used when approved by the Architect.
 - e. Work in freshly applied grout vigorously with a sponge rubber float, then let sit until some of its plasticity is gone but not until it loses its damp appearance. At this point it shall be rubbed with clean, dry burlap to remove the excess grout, leaving no visible film on the surface but filling all air holes.
 - f. Keep the surface wet for a day after grouting and sack rubbing are completed.
7. Alternate methods of application and materials shall be subject to the approval of the Architect.

3.4. PATCHING

A. Formed Surfaces:

1. Promptly upon removal of contact forms and after concrete surfaces have been inspected, form ties shall be removed and all necessary patching and pointing shall be expertly done.
2. Honeycombed areas shall be removed down to sound concrete, coated with a bonding grout or approved compound and patched using a low shrinkage high bond mortar. Patched areas shall be cured by being kept damp for at least 5 days.
3. Tie holes shall be cleaned, dampened and filled solid with patching mortar or cement plugs of an approved variety.

B. Slabs on Grade: After entire slab is finished, shrinkage cracks that may appear shall be patched as follows:

1. Where slab is not exposed or where appearance is not important, cracks larger than 1/32 inch wide shall be filled with cement grout and struck off level with surface.
2. Where slab is exposed and appearance is important, unsightly cracks shall be repaired in a manner satisfactory in appearance to Architect. If this cannot be accomplished, concrete shall be considered defective.

3.5. DEFECTIVE CONCRETE

A. Defective concrete shall mean any of the following:

1. Concrete not meeting 100 percent of the specified 28 day compressive strength.
2. Concrete exhibiting rock pockets, voids, spalls, streaks, cracks, exposed reinforcing to extent that strength, durability, or appearance is adversely affected.
3. Concrete significantly out of place, line, or level.

4. Concrete not containing the required embedded items.
- B. Upon determination that concrete strength is defective:
 1. Should cylinder tests fall below minimum strength specified, concrete mix for remainder of work shall be adjusted to produce required strength. Core samples shall be taken and tested from cast-in-place concrete where cylinders and samples indicate inferior concrete with less than minimum specified strength.
 - a. Cores of hardened concrete shall be taken and tested in accordance with ASTM C 42 and C 39. Number and location of such cores shall be subject to the approval of Architect.
 - b. Cost of core sampling and testing will be paid for by the Contractor.
 - c. "85 percent" reduction in ACI 318 Section 26.12.4 will not justify low cylinder tests.
 - C. Upon determining that concrete surface is defective, Contractor may restore concrete to acceptable condition by cutting, chipping, pointing, patching, grinding, if this can be done without significantly altering strength of structure. Permission to patch defective areas will not be considered a waiver of the right to require removal if patching does not, in the opinion of the Architect, satisfactorily restore quality and appearance.
 - D. If core tests indicate that concrete is below the strength specified, or if patching does not restore concrete to specified quality and appearance, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
 - E. No repair work shall begin until procedure has been reviewed by the Architect, Structural Engineer and DSA

3.6. SURFACE HARDENER AND SEALER

- A. Seal all interior exposed flatwork with clear sealer, except surfaces receiving ceramic tile, quarry tile, poured flooring or other special finishes specified, or as scheduled on the Drawings.
 1. Apply sealer in 2 or 3 coats, in accordance with manufacturer's directions, using the maximum quantity recommended.
 - a. Concrete floors must be thoroughly cured for a minimum of 30 days and completely dry before treatment.
 - b. Surfaces to be treated must be clean, free of membrane curing compounds, dust, oil, grease and other foreign matter.
 - c. Upon completion, concrete surfaces shall be clean and without discoloration or traces of excess hardener left on the surface.

- B. Apply sprayable hardener/sealer at locations as scheduled or as indicated on the Drawings. Apply in accordance with the manufacturer's favorably reviewed application instructions and recommendations.

3.7. GROUTING

- A. Prepare and place grout materials at locations as indicated on the Drawings in accordance with the manufacturer's recommendations and installation instructions.
- B. Pack grout materials solidly between bearing surfaces and bases or plates as indicated and to ensure no voids.

3.8. ADJUSTING AND CLEANING

- A. Remove all debris, excess materials, tools and equipment resulting from or used in this operation at completion of this work.

END OF SECTION 03 30 00

SECTION 03 62 13
NON-METALLIC NON-SHRINK GROUTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Description: Work includes, but is not necessarily limited to, providing nonshrink, nonmetallic, ready-to-use, fluid precision grout material as shown on drawings and as described below.

1.2 DEFINITIONS

- A. Dry Pack Grout - A damp mixture of portland cement, fine aggregate, and water, possessing a very stiff consistency which requires it to be placed by tamping or ramming.
- B. Plastic Grout - The consistency of grout which will form a nearly level surface only when repeatedly rodded or vibrated. Flow characteristics are 100 to 125 percent at 5 drops on the ASTM C 230 flow table.
- C. Flowable Grout - The consistency of grout which will form a nearly level surface when lightly rodded. Flow characteristics of at least 125 percent at 5 drops on the ASTM C 230 flow table and an efflux time through the CRD C 611 flow cone of no less than 30 seconds.
- D. Fluid Grout - The consistency of grout which will form a nearly level surface without vibration or rodding. Flow characteristics have an efflux time of less than 30 seconds through the CRD C 611 flow cone.

1.3 SUBMITTALS

- A. Certified Test Results:
 - 1. Submit grout manufacturer's Certified Test results showing compliance with CRD C 621 for each specified grout consistency.
 - 2. Test Reports: Submit test reports per Article 3.5.

1.4 QUALITY ASSURANCE

- A. Manufacturer: Manufacturer shall have produced the specified products for a period of 5 years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- B. Staff

1. For fabrication and installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and who are completely familiar with the manufacturer's recommended methods of installation as well as the requirements of this work.
2. Installer shall be certified and approved for use of specified grout products.
3. Corps of Engineers CRD Standards
 - a. CRD C 400 - Requirements for Water for use in Mixing and Curing Concrete
 - b. CRD C 611 - Method of Test for Flow of Grout Mixtures
 - c. CRD C 619 - Specification for Grout Fluidifiers
 - d. CRD C 621 - Specification for Nonshrink Grout

1.5 REFERENCES

A. Codes and Ordinances

1. *California Building Code 2019 edition.*

B. Organization and Trade Standards

1. ACI Standards

- a. ACI 304 - Measuring, Mixing, Transporting and Placing Concrete.
- b. ACI 305 - Hot Weather Concreting.
- c. ACI 306 - Cold Weather Concreting.
- d. ACI 308 - Curing Concrete.
- e. ACI 347 - Concrete Formwork.

2. ASTM Standards

- a. ASTM C 109 - Standard Method of Test for Compressive Strength of Hydraulic Cement Mortars.
- b. ASTM C 190 - Test Method for Tensile Strength of Hydraulic Cement Mortars
- c. ASTM C 191 - Test Method for Time of Setting of Hydraulic Cement Mortars by Vicat Needle
- d. ASTM C 192 - Method of Making and Curing Concrete Test Specimens in the Laboratory

- e. ASTM C 230 - Specification for Flow Table for use in Tests of Hydraulic Cements
 - f. ASTM C 232 - Test Method for Bleeding of Concrete
 - g. ASTM C 266 - Test Method for Time of Setting of Hydraulic Cement Mortars by Gillmore Needle
 - h. ASTM C 309 - Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
 - i. ASTM C 827 - Test Method for Early Volume Change of Cementitious Mixtures
 - j. ASTM C-939 – Fluidity
 - k. ASTM C-940 - Expansion
 - l. ASTM C-1090 – Shrinkage
 - m. ASTM C-1107 – Standard Specification for Non-shrink Grouts
3. Corps of Engineers CRD Standards
- a. CRD C 400 - Requirements for Water for use in Mixing and Curing Concrete
 - b. CRD C 611 - Method of Test for Flow of Grout Mixtures
 - c. CRD C 619 - Specification for Grout Fluidifiers
 - d. CRD C 621 - Specification for Nonshrink Grout

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grout compound to the jobsite in manufacturer's original containers.
- B. Store grout compound in a dry location.
- C. Do not puncture containers or otherwise expose grout compound to contamination.

1.7 SITE CONDITIONS

- A. General
 - 1. Provide protection against wind and direct sun contact for all areas to be grouted.
 - 2. Maintain temperatures between 45 F and 90 F on all surfaces to be grouted for 24 hours prior to and for 24 hours after grouting.

1.8 SCHEDULING

- A. General

1. Schedule no other work in areas to be grouted that would interfere with grouting work or potentially cause damage thereto.
2. Allow no vibratory work in adjacent areas for first 24 hours after placing grout.

PART 2 - PRODUCTS

2.1 NON-SHRINK GROUT

A. General:

1. All non-shrink grout shall be the product of one manufacturer.
2. Design is based on the referenced products of Sika. Equal products manufactured by Sika, Edoco, L&M Construction and US Grout Corporation may be acceptable subject to Architect's review of submittals.

B. Product Characteristics:

1. Series: Sika Grout 212.
2. Type: Non-shrink, non-metallic, variable consistency grout.
3. Flow:
 - a. Plastic: 100-124 percent per ASTM C 230.
 - b. Flowable: 124-145 percent per ASTM C 230.
 - c. Fluid: 10-30 second efflux time per CRD C-79.
4. Compressive Strength:
 - a. Plastic: 4,500 psi minimum at 1 day, 8,900 psi minimum at 28 days, tested per CRD C 621.
 - b. Flowable: 4,100 psi minimum at 1 day, 8,100 psi minimum at 28 days, tested per CRD C 621.
 - c. Fluid: 2,700 psi minimum at 1 day, 7,200 psi minimum at 28 days, tested per CRD C 621.
5. Splitting Tensile Strength:
 - a. Plastic: 600 psi minimum at 28 days per ASTM C 496.
 - b. Flowable: 575 psi minimum at 28 days per ASTM C 496.
 - c. Fluid: 500 psi minimum at 28 days per ASTM C 496.

6. Flexural Strength:
 - a. Plastic: 1,400 psi at 28 days per ASTM C 580.
 - b. Flowable: 1,300 psi at 28 days per ASTM C 580.
 - c. Fluid: 1,000 psi at 28 days per ASTM C 580.
7. Bond Strength: minimum 2,200 psi at 28 days per ASTM C 882 modified.
8. Expansion Value:
 - a. Plastic: 0.021 percent at 28 days per CRD C 621.
 - b. Flowable: 0.056 percent at 28 days per CRD C 621.
 - c. Fluid: 0.027 percent at 28 days per CRD C 621.

2.2 MATERIALS

- A. Water: Provide potable water, free of deleterious substances, and at temperature recommended by manufacturer.
- B. Curing Compound: Provide curing compound complying with ASTM C 309 and suitable for subsequent finish.
- C. Forming Materials: Approved wood or metal forming components, properly joined and braced.

2.3 OTHER PRODUCTS

- A. Provide all other products necessary for complete installation and operation. Such products shall be subject to the review of the Architect.

2.4 MIXES

- A. Mix grouting compounds according to the manufacturer's written instruction printed on the grout compound containers.
- B. Mix grouting compound with the minimum amount of water necessary to place the grout properly.
- C. Do not use grout at fluid consistency without prior Architect's approval.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:

1. Prior to installation of grout, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 2. Verify that all work can be installed in strict accordance with all pertinent codes and regulations, the original design, reviewed submittals, and manufacturers' recommendations.
 3. In the event of discrepancy, immediately notify the Architect.
 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
- B. Acceptance of Surface Conditions: Provide Architect with written acceptance of surface conditions, certifying that all surfaces are suitable for work of this section to proceed.

3.2 PREPARATION

A. Concrete Surfaces:

1. Roughen concrete surfaces to be grouted.
2. Clean surfaces to be grouted.
3. Soak concrete surfaces to be grouted for 24 hours before placement of grout. Blow out standing water prior to placing grout.
4. Seal forms and make watertight.
5. Maintain proper temperatures. During hot weather, use cold mixing water and shade grouting areas. During cold weather, use warm water and heat entire grouting area.
6. Have sufficient mixing equipment on hand for rapid and continuous placement of grout.

B. Steel Surfaces:

1. Sandblast or otherwise clean to expose bare metal.
2. Verify that required air relief holes are present and clear of obstructions.

3.3 INSTALLATION

A. Bases and Plates:

1. Place grout rapidly and continuously at the stiffest mix suitable for placement.
2. Place grout directly into designated area in one direction only.
3. Pump, pour, rod or strap grout into place; use no vibratory placing equipment.
4. Work grout as little as possible to avoid segregation of the grouting compound components.

5. Place grout to a level above the top of the base or plate to assure complete face to face contact between grout and base or plate.
6. Begin curing of fluid grout immediately after final placement.
7. Remove forms only after the final set of grout as described for the mix in ASTM C 266.
8. Shape grout installation by forming shoulders immediately after removal of forms. Remove all grout above bottom of base plate. Finish curing the installation.

B. Vertical Anchor Bolts and Dowels:

1. Place grout in the lower half of the bolt or dowel hole at the stiffest mix suitable for plastic to flowable grout installation.
2. Place bolt or dowel directly into the bottom of the seat. Secure to the proper elevation and plumb.
3. Pour grout into hole to the appropriate elevation.
4. Work grout as little as possible to avoid segregation of the grouting compound components.
5. Cure grouting compound immediately after placement.

C. Horizontal Anchor Bolts and Dowels:

1. Place two inches of grout in the lower half of the bolt or dowel hole at the stiffest mix suitable for dry pack grout installation.
2. Place bolt or dowel directly into the bottom of the seat. Secure to the proper elevation and level.
3. Pack grout into hole and consolidate completely every three inches.
4. Work grout as little as possible to avoid segregation of the grouting compound components.
5. Curing is not required in this installation.

D. Flowable Grouting of Keys and Cavities:

1. Provide air relief holes in grouting chase at 1 foot intervals.
2. Place grout rapidly and continuously at the stiffest mix suitable for flowable grout installation.
3. Place grout for large pours into a head box to facilitate flow and eliminate entrapped air.
4. Pour or pump grout from bottom of keyway; use no vibratory placing equipment.
5. Work grout as little as possible to avoid segregation of the grouting compound components.
6. Ensure that all air relief holes vent properly and extrude grout.

E. Pumped/Pressure Grouting:

1. Deliver grout compound to pump or pressure grouting machine at the desired consistency for the intended use.
2. Rapidly and continuously place grout from bottom of the placement to avoid cold joints and voids.
3. Ensure that back-up delivery equipment is available in case of mechanical failure of primary placement equipment.
4. Grout may be pumped and pressure applied by use of Chemgrout Pressure Grouting equipment.
5. Once mixed do not retemper grout compound.
6. Place grout with a minimum of vibratory equipment.
7. Remove forms only after final set of grout as described for the mix in ASTM C 266.
8. Shape grout installation by forming shoulders immediately after removal of forms. Remove all grout above bottom of base plate. Finish curing the installation.

3.4 TOLERANCES

A. Dimensional:

1. Dimensional tolerance shall be 0.00 inches.
2. Shoulder forming shall be maintained to line and level to plus/ minus 1/8 inch.

3.5 FIELD QUALITY CONTROL

A. Design Mix:

1. Maintain quality of placed grout by periodic test.
2. For design mix employed, conduct bleed water test as described in ASTM C 232.

B. Field Non-shrink Properties:

1. Verify non-shrink properties of on-site grout materials per the following procedure.
2. Fill two (2) 6 inch x 12 inch concrete test cylinders with the mixed grout. Screed off level.
3. Place metal base plate on top of cylinder. Cover base plate with second cylinder.
4. At 14 days remove upper cylinder.

5. Inspect grout/base plate relationship. Grout shall extend above rim of cylinder a minimum of 0.2 percent per CRD C 621. Grout shall also bond to base plate with sufficient strength to permit lifting of cylinder.
6. All grout not complying with above criteria shall be immediately rejected and replaced as directed by Architect.

3.6 PROTECTION

A. General:

1. Protect placed grout from vibrations for 24 hours after start of placement.
2. Maintain temperatures between 45 F and 90 F for 48 hours after placement.
3. Maintain wet curing method for 72 hours after placement or use approved curing compound.
4. Protect placed grout from wind and sun for 24 hours after placement.

END OF SECTION

SECTION 04 05 00
MORTAR AND GROUT

PART 1 - GENERAL

1.1. GENERAL REQUIREMENTS

- A. The requirements of Division 1 apply to all Work of this Section.

1.2. SCOPE

- A. Provide all materials, labor and accessories as required and specified for complete mortar and grout installation in masonry walls.

1.3. RELATED WORK (See also Table of Contents):

- A. Reinforcing Steel: Section 03 21 00.
- B. Cast-In-Place Concrete: Section 03 30 00.
- C. Concrete Unit Masonry: Section 04 22 00.

1.4. QUALITY ASSURANCE

- A. Standards and References: (Latest Edition unless otherwise noted)
 - 1. 2019 California Building Code (CBC) with State of California Amendments.
 - 2. TMS 402-16 – Building Code Requirements for Masonry Construction
 - 3. TMS 602-16 – Specification for Masonry Structures
 - 4. ASTM C144 – Aggregate for Masonry Mortar.
 - 5. ASTM C150 – Portland Cement.
 - 6. ASTM C207 – Hydrated Lime for Masonry Purposes
 - 7. ASTM C270 – Standard Specification for Mortar for Unit Masonry
 - 8. ASTM C404 – Aggregates for Grout
 - 9. ASTM C476 – Standard Specification for Grout for Masonry
 - 10. ASTM C1019 – Method of Sampling and Testing Grout

- B. Tests and Inspections:

1. A testing program is required prior to start of construction. Testing program to be done in Compliance with CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
 2. All tests and inspections herein are to be performed by an independent testing laboratory approved by the building official.
 3. Sample panel construction: For masonry governed by Level 2 or 3 Quality Assurance, construct sample panels of masonry walls per TMS 602 Article 1.6 D. The specifier has the option of permitting a segment of the masonry construction to serve as a sample panel or requiring a separate stand-alone panel.
 4. Mortar and Grout Tests: At the beginning of Masonry Work, at least 1 test sample each of mortar and grout shall be taken on 3 successive working days, then once per week with at least one sample taken for each 5000 square feet of wall area, or fraction thereof.
 - a. Test specimens shall be made in accordance with ASTM C1019 for grout and ASTM C780 for mortar.
 - b. Test specimens shall be continuously stored in moist air until tested.
 5. A special inspector shall be employed per CBC Section 1704A during the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.
- C. Submittals:
1. Mix design for mortar and grout shall be submitted for review.
 2. Supplier's certificates indicating materials comply with the specifications below. They shall include but are not necessarily limited to:
 - a. Aggregates
 - b. Cement
 - c. Admixtures

PART 2 - PRODUCTS

2.1. MATERIALS

- A. Cement: ASTM C150, Type I or II, low alkali; natural gray.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Quicklime: ASTM C5.
- D. Lime Putty: Made from hydrated lime or quicklime.

1. If made from quicklime, other than processed pulverized quicklime, slake lime and then screen through a No. 16 mesh sieve. Before using, store and protect slaked and screened lime putty for not less than 10 days.
2. Processed pulverized quicklime shall be slaked for not less than 48 hours, and shall be cool when used.
3. Lime putty prepared from hydrated lime may be used immediately after mixing.
4. Lime putty prepared from quicklime or pulverized quicklime shall have a plasticity figure, after slaking and screening, of not less than 200, and shall weigh not less than 80 lbs. per cubic foot and not more than 90 lbs. per cubic foot. Lime putty prepared from hydrated lime shall conform to ASTM C207, Type S.

E. Aggregate:

1. For Mortar: ASTM C144.
2. For Grout: ASTM C404.

F. Admixture: "Sika Grout Aid", "BASF MasterPel 240MA"

G. Water: Suitable for domestic consumption.

2.2. MORTAR

- A. Mortar shall be Cement-lime, Type S and shall conform to CBC Section 2103A.2.
- B. Mortar shall be made with admixtures that are proportioned, added and mixed in strict accordance with manufacturer's directions.

2.3. GROUT

- A. Grout shall have a 28-day compressive strength of 2000 psi or f'm, whichever is greater. Grout shall conform to CBC Section 2103A.3.
- B. Coarse Grout: Coarse grout shall be used in all multi-wythe grout spaces of 2 inches or more and in all filled-cell masonry construction.
- C. Add grout admixture in accordance with the manufacturer's recommendations.

PART 3 - EXECUTION

3.1. MIXING MORTAR AND GROUT

- A. Mix mortar and grout in accordance with TMS 602 Articles 2.6A and 2.6B.
- B. Accurately measure materials in suitably calibrated devices; shovel measurements are not acceptable.

- C. Place sand, cement and water in mixer in that order and mix for at least 2 minutes; then add lime putty and continue mixing as long as necessary to secure a uniform mass, but in no case less than 10 minutes.
- D. Use mixers of at least 1 sack capacity; batches requiring fractional sacks will not be permitted unless cement is weighed for each batch.

3.2. GROUTING PROCEDURES

- A. Specified under Sections 04 22 00.

3.3. RETEMPERING

- A. When necessary to retemper mortar, add water and remix; retempering by dashing water over mortar will not be permitted.
- B. Any mortar which is unused within 2 hours after initial mixing and any mortar that has begun to set shall not be used.

3.4. DEFECTIVE MORTAR OR GROUT

- A. Should the strength of mortar or grout fall below that specified, remainder of Work shall be adjusted to reach required strength. Work in place representing inferior grout and mortar and indicating a strength less than the minimum specified shall be tested by taking and testing core samples. Number and location of cores shall be determined by Structural Engineer.
- B. Should compression tests of cores fail to meet required strength, masonry shall be deemed to be defective and shall be removed and replaced at no cost to Owner.
- C. Costs relative to taking and testing of core samples shall be paid by Owner and will be deducted from Contract Amount. Cost of patching core holes shall be borne by Contractor.

END OF SECTION 04 05 00

SECTION 04 22 00
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

- A. Furnish and install all concrete unit masonry, reinforcement, and all required accessories and materials as shown on the Drawings and specified here.
 - 1. Cooperate with other trades for embedded items, furnished under those sections and installed here.
 - 2. Supervise setting of dowels for masonry furnished and installed under Section 03 21 00, Reinforcing Steel.

1.3 RELATED WORK (See also Table of Contents):

- A. Reinforcing Steel: Section 03 21 00.
- B. Cast-in-Place Concrete: Section 03 30 00.
- C. Mortar and Grout: Section 04 05 00.
- D. Structural Steel: Section 05 12 00.
- E. Miscellaneous Metal: Section 05 50 00.

1.4 QUALITY ASSURANCE

- A. Allowable Tolerances: Maximum deviation from indicated line or plane of installed concrete masonry units shall not exceed 1/4 inch in 10 feet in any direction.
- B. Standards and References: (Latest Edition unless otherwise noted):
 - 1. 2019 California Building Code (CBC) with State of California Amendments.
 - 2. TMS 402-16 – Building Code Requirements for Masonry Construction
 - 3. TMS 602-16 – Specification for Masonry Structures
 - 4. ASTM C90 – Specification for Loadbearing Concrete Masonry Units

5. ASTM C140 – Standard Test Methods for Sampling and Testing of Concrete Masonry Units and Related Units
 6. ASTM C426 – Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units
- C. Submittals: Refer to Section 01 33 00 for submitting the following items:
1. Suppliers certificate indicating units comply with material standards indicated below:
 2. See Section 03 21 00 for reinforcing steel submittals.
- D. Tests and Inspections:
1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
 2. All tests and inspections herein are to be performed by an independent testing laboratory approved by the enforcement agency.
 3. Sample panel construction: For masonry governed by Level 2 or 3 Quality Assurance, construct sample panels of masonry walls per TMS 602 Article 1.6 D. The specifier has the option of permitting a segment of the masonry construction to serve as a sample panel or requiring a separate stand-alone panel.
 4. Test three sample units prior to construction. Test also three sample units during construction for every 5,000 square feet of wall area.
 - a. Units will be tested for compressive strength on both the net and gross area per ASTM C140.
 - b. Units will be tested for linear drying shrinkage per ASTM C426.
 5. A special inspector shall be employed per CBC Section 1705A.4 to inspect the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.
 6. Core Testing: Not less than two cores per 5,000 square feet of floor area or wall area, whichever is greater and at least two cores from each building or structure. Core in locations approved by the Architect and test per CBC Section 2105A.4. Repair holes as directed by the Architect.
 7. See Section 03 21 00 for reinforcing steel tests and inspections.

1.5 PRODUCT HANDLING

- A. Scaffolding, runways and ladders required for work under this Section shall be provided by masonry contractor, and shall be heavy trades type substantially built and in compliance with State labor laws, safety codes and other regulatory agencies as applicable to this project.
- B. Store masonry units off the ground in a dry location, covered and protected from absorbing moisture.

- C. Store masonry accessories, including metal items, in such a way as to prevent corrosion or accumulation of dirt and oil.

PART 2 - PRODUCTS

2.1 MASONRY UNITS

- A. Masonry units shall be hollow load bearing masonry units conforming to ASTM C90 and CBC Section 2103A.1.
 - 1. Weight: Medium weight
 - 2. Maximum lineal shrinkage from saturated to oven dry condition of not more than 0.065 percent.
 - 3. Twenty-eight day compressive strength of 2000 psi.
 - 4. Moisture controlled units.
- B. Unit Type
 - 1. 8" wide by 8" high x 16" long unless specified otherwise.
- C. Provide bond beam units, open end units and other special units as indicated. Use open end units at cells containing vertical reinforcement per CBC 2104A.1.3.1.2.1.

2.2 MORTAR AND GROUT

- A. Specified under Section 04 05 00.

2.3 ACCESSORY MATERIALS

- A. Reinforcing Bars: ASTM A615, Grade 40 or 60, as indicated in Section 03 21 00, deformed bars. Where bars are to be welded, ASTM A706 Grade 60 bars shall be used.
 - 1. Tie Wire: Black annealed steel wire not lighter than 16 gauge.
- B. Ladder-type Joint Reinforcing: ASTM A951. Ladder-type joint reinforcing shall be comprised of 9-gauge side rods and 9-gauge cross rods at 16" on center and shall conform to ASTM A951. Crossrods are to be butt welded to side rods. Ladder-type joint reinforcement shall be hot dip galvanized or stainless steel.
 - 1. Width: Fabricate joint reinforcement in units with widths a minimum of 2" less than nominal width of walls. Provide mortar coverage over joint reinforcement of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.
- C. Provide spacers to firmly hold reinforcement in place.
- D. Anchor Bolts: All anchor bolts cast in masonry shall be headed studs or headed bolts with cut threads conforming to ASTM F1554 Grade 36 or ASTM A307 or ASTM A36 as indicated on drawings.

- E. Expansion Anchors: All expansion bolts installed in masonry shall be Hilti Kwik Bolt 3 per ICC ESR-1385, Simpson Wedge-All per ICC ESR-1396 or Dewalt/Powers Power-Stud+ SD1 per ICC ESR-2966. See Structural Drawings for installation requirements, testing and special head requirements as applicable. Substitution of other brands or anchors shall proceed only after written approval from the Structural Engineer and the Building Official has been obtained.
- F. Adhesive Anchors: All drill and epoxy threaded rods shall be ASTM F1554 Grade 36 or Grade 50, as indicated on drawings, and installed in masonry with Hilti HIT-HY 270 per ICC ESR-4143, Simpson SET-XP per UES ER-265 or Dewalt/Powers AC100+ Gold per ICC ESR-3200. See Structural Drawings for installation requirements, testing and special head requirements as applicable. Substitution of other brands or anchors shall proceed only after written approval from the Structural Engineer and the Building Official has been obtained.
- G. Screw Anchors: All screw anchors installed in masonry shall be Hilti Kwik HUS-EZ per ICC ESR-3056, Simpson Titen HD per ICC ESR-1056 or Dewalt/Powers Screwbolt+ per ICC ESR-4042. See Structural Drawings for installation requirements, testing and special head requirements as applicable. Substitution of other brands or anchors shall proceed only after written approval from the Structural Engineer and the Building Official has been obtained.

2.4 JOINTS

- A. All joints shall be 3/8" thick joints for concrete block. Tool exposed interior and exterior joints and concealed exterior joints to produce a dense slightly concave surface that is well bonded to unit at edges. Tool joints behind room base, switches, and outlet plates to produce a smooth dense joint flush with the face of adjacent masonry units, where occurring on the job. Cut joints flush on concealed interior surfaces and surfaces to be plastered.

2.5 SEALER

- A. Contractor shall provide and install minimum two coats, BASF MasterProtect H107 masonry sealer at all CMU walls. BASF MasterProtect H107 product shall meet all state vapor requirements. Sealer shall be clear and non-gloss product.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive masonry and verify following:
 - 1. That foundation surface is level to permit bed joint with range of 1/4 minimum to 3/4 inch maximum for partially grouted or 1-1/4" maximum for fully grouted.
 - 2. That edge is true to line to permit projection of masonry to less than 1/4-inch.
 - 3. That projecting dowels are free from loose scale, dirt, concrete, or other bond-inhibiting substances and properly spaced and located.
- B. Do not begin work before unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean concrete surfaces to receive masonry. Remove laitance or other foreign material lodged in surfaces by sandblasting or other means as required. Joints between concrete and masonry shall be considered construction joints. See Concrete specifications.
- B. Ensure masonry units are clean and free from dust, dirt, or other foreign materials before laying. Do not use damaged masonry units, damaged components of structure, or damaged packaged materials.
- C. Establish lines, levels, and coursing. Protect from disturbances.
- D. Provide temporary bracing during erection of masonry work. Maintain in place until masonry has set to provide permanent bracing.

3.3 COURSING

- A. Erect masonry in accordance with CBC Section 2104A.1.
- B. Place masonry to lines and levels indicated to the following tolerances:
 - 1. Variation from Unit to Adjacent Unit: 1/32-inch max.
 - 2. Variation from Plane of Wall: 1/4-inch in 10 feet.
 - 3. Variation from Plumb: 1/4-inch.
 - 4. Variation from Level Coursing: 1/8-inch in 3 feet; 1/4-inch in 10 feet; 1/2-inch maximum.
 - 5. Variation of Joint Thickness: 1/8-inch in 3 feet.
- C. Bond: Unless noted otherwise, lay concrete masonry units in running bond with vertical joints located over score of unit in course below (and vice versa).
- D. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
- E. Preserve the vertical continuity of cells in concrete unit masonry. The minimum clear horizontal dimensions of vertical cores shall be 3 x 3 inches for 8-inch wide block.

3.4 PLACING AND BONDING

- A. Do not install cracked, broken or chipped masonry units.
- B. Lay only dry concrete masonry units. Do not wet concrete masonry prior to laying up units unless written permission is obtained from the Engineer.
- C. Lay masonry in full bed of mortar, properly jointed with other work. Deep or excessive furrowing of mortar joints is not permitted.
 - 1. Block Cap: Lay with full mortar coverage on horizontal and vertical joints.

2. Install grout cap where and as indicated.

- D. Fully bond intersections and external and internal corners.
- E. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- F. Remove excess mortar.
- G. Perform job-site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges. Install cut units with cut surfaces and, where possible, cut edges concealed.
- H. Step back unfinished work for joining with new work. Do not use toothing.
- I. Provide cleanouts as indicated in “grouting” below.
- J. Matching Existing Masonry Work: Match coursing, bonding, color and texture of new masonry work with existing work wherever possible.

3.5 JOINTS

- A. Horizontal and vertical joints at masonry units shall be 3/8-inch wide and as follows:
 1. Point joint tight in unpurged masonry below ground.
 2. All end joints shall be fully filled with mortar and joints squeezed in bed joints shall be held back approximately 1/2-inch from cell to provide positive bond with grout.
 3. Joints shall be struck flush at all areas to receive plaster, stucco and any other finish material other than paint.

3.6 MASONRY REINFORCEMENT

- A. Place reinforcement in accordance with Article 3.4 B of TMS 602.
- B. Reinforcing steel shall not be bent or straightened in a manner that will damage the material. Bars with kinks or bends not shown on the plans shall not be used. Heating of bars for bending is not permitted.
 1. Bars shall conform accurately to the sizes, shapes, lines and dimensions shown on drawings and with hooks and beds made as detailed. Bars shall be placed as indicated on the drawings and centered on grout space.
 2. At the time grout is place around it, reinforcing steel shall be clean of mill scale or other coatings that will destroy or reduce bond.
 3. All vertical reinforcing steel shall be installed in one piece, full height of wall, and braced throughout its height in a manner that will retain the steel in proper position and provide the proper clearance.

- C. Foundation dowels that interfere with unit webs are permitted to be bent to a maximum of 1 inch horizontally for every 6 in of vertical height.
- D. Reinforcing steel shall be secured to all foundation dowels and held in place at spacing not to exceed 192 bar diameters.

3.7 GROUTING

A. General Requirements:

- 1. All cells shall be grouted solid.
- 2. Use low lift or high lift grouting at Contractor's option.
- 3. Use grout pump, hopper or bucket to place grout.
- 4. Place grout in final position within 1-1/2 hours after introduction of mixing water.
- 5. Stop grout approximately 1½ inches below top of last course, except at top course bring grout to top of wall. Do not form grout keys within beams.

B. Low Lift Grouting:

- 1. Do not lay units higher than 48 inches before grouting.
- 2. If mortar has been allowed to set prior to grouting, remove all fins protruding more than ½-inch into grout space.
- 3. Conform to requirements of CBC Section 2104A.1.3.1.2.2.
- 4. Consolidate each lift with mechanical vibration twice per Article 3.5 E of TMS 602. Once while placing grout and once more after initial absorption of water but before set.

C. High Lift Grouting:

- 1. Conform to requirements of CBC Section 2104A.1.3.1.2.3 and DSA IR 21-2.13.
- 2. Lay up walls, subject to maximum height limitations of Table 6 under Article 3.5 of TMS 602.
- 3. Provide clean out holes at the bottom of every pour in cells containing vertical reinforcement per CBC 2104A.1.3.1.1.2.3. Construct clean out courses with open-bottom bond beam units inverted to permit cleaning of all cells by flushing. Cleanouts shall be not less than 3x4inch openings cut from one face shell. Do not plug clean out holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected.
- 4. Clean mortar droppings from the bottom of the grout space and from reinforcing steel. Remove mortar fins protruding more than ½-inch into the grout space by dislodging the projections with a rod as the work progresses or by washing the grout space at least twice a day during erection using a high-pressure stream of water.
- 5. Do not place grout in hollow unit masonry until mortar joints have set for at least 24 hours and clean out plugs have cured 24 hours.

6. Place grout in lifts not to exceed 4 feet in height, with a waiting period between lifts, dependent on weather and absorption rate of the masonry, in order to place the succeeding lift after the preceding lift becomes plastic but prior to initial set. The first lift shall be consolidated using mechanical vibrators. After the required waiting period, place the second lift and consolidate with the vibrator, reconsolidating the lift below to a depth of 12 to 18 inches. Repeat the waiting, placing and consolidating process until the top of the grout pour is reached. Reconsolidate the top lift after the required waiting period. The high-lift grouting of any section of wall between lateral flow barriers shall be completed to the top of a pour in one working day unless a new series of clean out holes is established and the resulting horizontal construction joint cleaned.

3.8 WEATHER PROVISIONS FOR CONSTRUCTION

- A. Cold Weather Construction to be in accordance with Article 1.8 C of TMS 602.
- B. Hot Weather Construction to be in accordance with Article 1.8 D of TMS 602.

3.9 EXPANSION AND CONTROL JOINTS

- A. See drawings for type and location of expansion and/or control joints.
- B. Where control joints are not indicated on the drawings the Contractor shall submit a proposed control joint layout for Architect and Engineer approval. General guidelines for control joint locations are as follows:
 1. At major changes in wall height.
 2. At changes in wall thicknesses.
 3. At corresponding control joints in foundations, floors, or roof construction.
 4. Near wall intersections.
 5. At column centerlines.
- C. Maximum Spacing: Maximum control joint spacing in concrete masonry construction shall be such that the ratio of wall length to height shall not exceed 1.5 with a maximum spacing of 25 feet.

3.10 BOND BEAMS

- A. Bond beams shall be located where shown and detailed on the drawings, and shall be reinforced as indicated and as herein after specified.

3.11 BUILT-IN WORK

- A. Miscellaneous Embedded Items: All items indicated to be embedded in masonry shall be carefully located and anchored to prevent movement during grouting operations. Avoid cutting and patching.

3.12 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.13 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units.
- B. Pointing: During the tooling of joints, enlarge any voids or holes and completely fill with mortar.
- C. Dry brush masonry surface after mortar has set, at each day's work and after final pointing.
- D. Leave work and surrounding surface clean and free of mortar spots and droppings.
- E. Cleaning: Upon completion of masonry installation, repair all holes. Defective joints shall be cut out and rejointed. Exposed masonry surfaces shall be cleaned free of mortar, green stain and efflorescence.

3.14 SEALER

- A. Contractor shall install sealer as directed by the manufacturer. Coverage and installation rates shall be as per manufacturer's recommendations. Install sealer in minimum two coats at the rates required.

3.15 DEFECTIVE MASONRY

- A. Materials or workmanship not conforming to appearance or strength specified, will be deemed defective and shall be removed and replaced at no cost to Owner.
- B. Defective mortar and grout, as defined under Section 04 05 00; "Mortar and Grout" shall constitute defective masonry.

END OF SECTION 04 22 00

SECTION 05 12 00
STRUCTURAL STEEL

PART 1 - GENERAL

1.1. GENERAL REQUIREMENTS

- A. Requirements of Division 1 apply to all Work of this Section.

1.2. SCOPE

- A. Furnish and install all structural steel as shown and specified including, but not necessarily limited to the following:
 - 1. Prime coat painting and touch up.
 - 2. All cast-in-place anchor bolts, nuts, plates, etc.
 - 3. 10 gauge steel or 3/4 inch plywood templates for column anchor bolts.

1.3. RELATED WORK (See also Table of Contents)

- A. Metal Decking: Section 05 30 00.
- B. Metal Fabrications: Section 05 50 00.
- C. Cast-In-Place Concrete: Section 03 30 00.

1.4. QUALITY ASSURANCE

- A. General:
 - 1. Comply with the referenced ASTM standards for materials.
 - 2. Perform all welding only with AWS certified welders.
 - 3. Verification of accuracy:
 - a. Engage and pay for a registered civil engineer or licensed land surveyor to check the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection. Prior to erection, a survey shall be made of the as-built locations of all anchor rods and other embedded items associated with the attachment of structural steel. The party providing the survey shall submit written verification that the entire installation is in accordance with the contract documents and meets the allowable erection tolerances as set forth in the AISC "Code of Standard Practice for Steel Buildings and Bridges".
 - b. Columns shall be verified at each lift. Column shim details and procedures shall be submitted for review.

4. Paint:
 - a. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use thinners approved by paint manufacturer, and use within recommend limits.
 - b. Coordination of Work: Review other Sections in which prime paints are to be provided to ensure compatibility of coatings system for various substrates. Upon request, furnish information or characteristics of finish materials to be used.
 - c. Requirements of Regulatory Agencies: Comply with applicable rules and regulations of governing agencies for air quality control.
- B. Except where other requirements are specified, comply with the following standards (latest edition unless noted otherwise):
 1. AISC 360 "Specification for Structural Steel Buildings".
 2. AISC 303 "Code of Standard Practice for Steel Buildings and Bridges".
 3. AISC 341 "Seismic Provisions for Structural Steel Buildings"
 4. AISC 358 "Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications"
 5. RCSC "Specifications for Structural Joints Using High Strength Bolts".
 6. AISC 303 Section 10, Architecturally Exposed Structural Steel, Code of Standard Practice for Steel Buildings and Bridges
 7. AWS D1.1 "Structural Welding Code - Steel" – latest edition
 8. AWS D1.8 "Structural Welding Code – Seismic Supplement" – latest edition
 9. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
 10. SSPC-Vis 1 Pictorial Surface Preparation Standards for Painting Steel Structures
 11. SSPC-SP2 Hand Tool Cleaning
 12. SSPC-SP3 Power Tool Cleaning
 13. SSPC-SP6 Commercial Blast Cleaning
 14. SSPC-PA2 Measurement of Dry Paint Thickness with Magnetic Gauges
 15. California Building Code (CBC) – latest edition
- C. Submittals: (Submit under provisions of Section 01 33 00)

1. Product Data: Include laboratory test reports and other data to show compliance with specifications (include specified standards). Include certified copies of mill reports covering chemical and physical properties of each type of structural steel.
2. Shop Drawings:
 - a. Shop drawings shall include complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
 - b. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.
 - c. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.
 - d. Dimensions required to locate structural steel for manufactured items such as mechanical equipment, electrical equipment, dock levelers, etc., shall be coordinated and provided by the General Contractor. General Contractor shall also coordinate and provide dimensions to locate structural steel for window washing supports such as davits, tie-backs, etc.
3. Procedures:
 - a. Provide weld procedures for both prequalified welds and special welds to be submitted to the Owner's Testing Laboratory and the Architect.
 - b. Provide installation procedure and inspection for direct tension indicator washers detailed in supplemental specifications provided by the manufacturer for approval.
 - c. Procedures shall be submitted for both shop and field welds.

D. Tests and Inspections:

1. Provide special inspections and testing as described in the "Statement of Structural Special Inspections and Testing" within the structural drawings and as required by this section.
2. Testing Laboratory:
 - a. All materials, work, methods and equipment shall be subject to inspection at the mill, fabricating plant and at the building site. Material or workmanship not complying fully with the Contract Documents will not be accepted. The Contractor shall give the Testing Laboratory reasonable notice when ready for inspection and shall supply samples and test pieces and all facilities for inspection without extra charge. The Owner will assume the expense of making the tests and inspection except as otherwise specified in Division 1.
3. Cost of Testing and Inspection: Costs of testing and inspection of structural steel, except as specified hereunder and in Division 1, will be paid for by the Owner.
 - a. All transportation costs and per diem living costs for inspection at fabricators' plant further than 75 miles from the job site will be back-charged to the Contractor.
 - b. It is assumed that all fabrication will take place in one shop location only. All additional inspection costs will be back-charged to the Contractor.

- c. All mill tests and costs of re-test of plain materials shall be at the expense of the Contractor.
 - d. Costs of tests required due to Contractor's failure to provide steel identifiable in accordance with the indicated ASTM designation shall be at the expense of the Contractor.
4. Structural Steel Testing and Inspection:
- a. Structural Steel: If structural steel tests are indicated as required on the structural drawings, one tension and one bend test shall be made for each size of structural shape, plate and for each tube and pipe size. Tests shall be made in accordance with requirements of appropriate ASTM designations.
 - b. If structural steel tests are not indicated as required on the structural drawings, then for shapes, plates, bars, pipe and tubing, manufacturer's certified mill test reports and analysis for each heat will be acceptable for steel identifiable in accordance with indicated ASTM designation. Mill test reports shall indicate the physical and chemical properties of all structural steel used. Correlate individual heat numbers with each specified structural section.
 - c. Unidentifiable Steel:
 - 1) For F_y less than or equal to 36.0 ksi : Provide one tension and elongation test and one bend for each 5 tons or fraction thereof for each size.
 - 2) For F_y greater than 36.0 ksi : Provide one tension and elongation test and one bend or flattening for each piece.
 - d. Costs of retests and additional testing required by the use of unidentifiable steels shall be the Contractor's responsibility. Additional costs of testing incurred by the Owner shall be deducted from the Contract Final Payment.
5. Expansion Anchors: Load test as indicated on drawings.
6. Welding Inspection:
- a. For Moment Resisting Frame Welding inspection and testing requirements, see specification Section 05 12 24 - Welding of Moment Resisting Frames.
 - b. If shop or field welding inspection is indicated on the structural drawings or required by the applicable referenced standards, shop and field welded operations shall be inspected in accordance with AISC 360 by a qualified welding inspector employed by the Testing Laboratory. Such inspector will be a person trained and thoroughly experienced in inspection of welds. The inspector's ability to distinguish between sound and unsound welding will be reliably established
 - c. The welding inspector will make a systematic record of all welds. This record shall include:
 - 1) Identification marks of welders.
 - 2) List of defective welds.
 - 3) Manner of correction of defects.

- d. The welding inspector will check the material, equipment and procedure, as well as the welds. He will also check the ability of the welder. He will furnish the Architect with a report, duly verified by him that the welding which is required to be inspected is proper, and has been done in conformity with the Contract Documents, and that he has used all means to determine the quality of the welds.
- e. All full penetration groove welds will be subject to ultrasonic testing, as per AWS D1.1. All defective welds shall be repaired and retested with ultrasonic equipment at the Contractor's expense.
- f. Column Flanges: An area extending 6 inches above and below point where girder flanges are attached will be inspected. Column flange edges will be inspected visually and entire area ultrasonically for lamination, plate discontinuities, and non-metallic inclusions.
- g. When ultrasonic indications arising from the weld root can be interpreted as either a weld defect or the backing strip itself, the Engineer will be notified. The Engineer may require the removal of backing strip. The backing strip will be removed at the expense of the Contractor, and if no root defect is visible the weld will be retested. If no defect is indicated on this retest, and no significant amount of base and weld metal have been removed, no further repair of welding is necessary. If a defect is indicated, it will be repaired and retested at Contractor's expense.
- h. The ultrasonic instrumentation will be calibrated by the technician to evaluate the quality of the welds in accordance with AWS D1.1.
- i. Other methods of inspection, for example, X-Ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the inspection laboratory, and with the approval of the Engineer and DSA.
- j. Base metal thicker than 1-1/2 inches, when subjected to through thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such weld before and after joint completion.
- k. End-welded studs shall be sampled, tested, and inspected per the requirements of AWS D1.1.
- l. At the discretion of the owner's testing agency, the ultrasonic testing frequency may be reduced but may not be less than the following:
 - 1) Initially, all welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish the qualifications of each individual welder. If the reject rate is demonstrated to be less than 5 percent of the welds tested for each welder, then the frequency of testing for that welder may be reduced to 25 percent. If the reject rate increases to 5 percent or more, 100 percent testing will be re-established until the rate is reduced to less than 5 percent. The percentage of rejects will be calculated for each welder independently.
 - 2) A sampling of a least 40 completed welds will be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejectable defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3 ft in length where the effective throat is 1" or less, each 12 inch increment or fraction thereof shall be considered as one weld. For evaluating the reject rate of continuous welds over 3 ft in length where the effective throat is greater than 1", each 6 inch of length or fraction thereof shall be considered one weld.

7. High Strength Bolting Tests and Inspection:

- a. Furnish certified test reports for each lot of bolts in accordance with ASTM A325 and A490. Install bolts under the supervision of a qualified inspector in accordance with, Research Council "Specifications for Structural Joints using ASTM A325 or A490 Bolts".
- b. If high strength bolting inspection is indicated on the structural drawings or required by the applicable referenced standards, the testing laboratory shall provide inspection in accordance with AISC 360.
- c. While the work is in progress, the Inspector shall determine that the requirements of this Specification are met in the work. The Inspector shall observe the calibration procedures and shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is properly used to tighten all bolts.
 - 1) In addition to the requirement of the foregoing paragraph, for all connections specified to be slip critical (SC), the Inspector shall assure that the specified procedure was followed to achieve the pretension specified in the AISC. The pretension shall be verified by the inspector for these bolts.
 - 2) Bolts in connections identified as not being slip-critical nor subject to direct tension need not be inspected for bolt tension other than to ensure that the piles of the connected elements have been brought into snug contact.

1.5. PRODUCT HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
- B. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6. SEQUENCING/SCHEDULING

- A. Cooperate and coordinate this work with other trades for anchor bolts, and other required inserts, templates, etc. Align this work prior to installation of other materials.

PART 2 - PRODUCTS

2.1. MATERIALS

- A. Structural Steel: Except where indicated on drawings.
 1. W shapes: ASTM A572-50 or ASTM A992-50 unless indicated otherwise on drawings.
 2. Channels and other rolled shapes: ASTM A36 unless indicated otherwise on drawings.
 3. Angles, plates and bars: ASTM A36 unless indicated otherwise on drawings.

- B. AISC group 4 and 5 shapes and plates greater than 2 inches thick: ASTM A36 and/or ASTM A572 Grade 50 with supplementary requirements S91 Fine Austenitic Grain Size and S5 Charpy V-Notch Impact Test. For location of Charpy V-Notch test, see ASTM A6 Supplementary Requirement S30. Charpy V-Notch test shall be per ASTM A673, frequency P and shall meet a minimum average value of 20 ft-lbs absorbed energy at 70° F.
- C. Cold-Formed Steel Tubing: ASTM A500, Grade C.
- D. Steel Pipe: ASTM A53, Type E or S, Grade B.
- E. Anchor Bolts: All anchor bolts cast in concrete or masonry shall be headed bolts with cut threads conforming to ASTM F1554 grade 36, 55 (weldable per S1 Supplementary Requirements), or 105 as indicated on drawings.
- F. Machine Bolts: ASTM A307.
- G. High Strength Bolts, Nuts and Washers: Install in accordance with requirements for A325 and A490 slip critical and snug tight conditions as indicated on drawings. Install high strength bolts with snug tight type connections with threads included in shear plane except as otherwise noted. Install hardened washers in conformance with AISC Specifications.
 - 1. Bolt Specifications: Bolts shall conform to the requirements of the current edition of the Specifications of the American Society for Testing and Materials for High-Strength Bolts for Structural Steel Joints, ASTM F3125 Gr A325, Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength, ASTM F3125 Gr A490 as indicated on drawings.
 - 2. Bolt Geometry: Bolt dimensions shall conform to the current requirements of the American National Standards Institute for Heavy Hex Structural Bolts, ANSI Standard B18.2.1. The length of bolts shall be such that the end of the bolt will be flush with or outside the face of the nut when properly installed.
 - 3. Nut Specifications: Nuts shall conform to the current chemical and mechanical requirements of the American Society for Testing and Materials Standard Specification for Carbon and Alloy Steel Nuts, ASTM A563, Appendix Table X1.1. Provide Grade A Heavy Hex nuts for Grade 36 and 55 threaded rods. Provide Grade DH or ASTM A194-2H Heavy Hex nuts for Grade 105 threaded rod.
 - 4. Washers: Flat circular washers and square or rectangular beveled washers shall conform to the current requirements of the American Society for Testing and Materials Standard Specification for Hardened Steel Washers, ASTM F436. Washers for base plates shall be placed top and bottom of plate and shall be ASTM A36 square or circular unless ASTM F844 are permitted on the drawings.
 - 5. Tension Control Fastener System: Bolts shall conform to the requirements of the current edition of the Specifications of the American Society for Testing and Materials for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, ASTM F3125, Gr F1852, providing equivalent properties to ASTM A325 or A490 as indicated on drawings.
- H. Headed Stud-Type Shear Connectors: ASTM A29-12, Grade 1010 through 1020, cold-drawn carbon steel with dimensions complying with AISC Specifications, with minimum physical properties as follows:
 - 1. Ultimate Tensile strength: 65,000 psi.
 - 2. Yield strength – 0.2% offset: 51,000 psi
 - 2. Elongation in 2 inches: 20 percent

3. Reduction of area: 50 percent.
- I. Provide hexagonal heads and nuts for all connections per ASTM A563, Appendix Table X1.1.
- J. Electrodes for Welding: Comply with AWS Code, E70 Series minimum. Fabricator to select proper electrodes according to weld procedures as submitted.
- K. Shop Primer – See Section 3.4, Painting and Cleaning
- L. Powder Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems.
- M. Expansion Bolts: Hilti Fastening Systems “Kwik-Bolt Concrete Expansion Anchors” to concrete; Ramset “Dynabolt Sleeve Anchors” to masonry or approved equal.

PART 3 - EXECUTION

3.1. FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assembly structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated to provide the flattest floor possible. The contractor shall coordinate member tolerances with finishes.

Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

- B. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.
- C. Unless noted otherwise, make holes 1/16 inches larger than the nominal bolt diameter.
- D. Welding, Shop and Field: Weld by shielded arc method, submerged arc method, flux cored arc method, or other method approved by AWS. Perform welding in accordance with AWS Code. All welders, both manual and automatic, shall be certified in accordance with AWS "Standard Qualification Procedure" for the Work to be performed. See paragraph "welding" herein, for detailed requirements. If sizes of fillet welds are not shown on drawings, use AWS minimum weld size but not less than 3/16 inch fillet welds.
- E. Bolt Holes for Other Work: Provide holes required for securing other work to structural steel framing.

Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

Cut, drill, or punch holes perpendicular to metal surfaces and remove all burrs. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

F. AISC Group 4 and 5 shapes and built up members shall meet the requirements for joints in AISC Sections J1.5, J1.6, J2.7 and M2.2.

G. High Strength Bolts:

1. Installation and Tightening:

- a. Handling and Storage of Fasteners: Fasteners shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protected storage. Fasteners not used shall be returned to protected storage at the end of the shift. Fasteners shall not be cleaned of lubricant that is present in as-delivered condition.
- b. Tension Calibrator: A tension measuring device shall be required at all job sites where bolts in slip-critical joints are being installed and tightened. The tension measuring device shall be used to confirm: (1) the suitability to satisfy the requirements of AISC for the complete fastener assembly, including lubrication if required to be used in the work, (2) calibration of wrenches, if applicable, and (3) the understanding and proper use by the bolting crew of the method to be used. The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in 1.d. below, as applicable. The accuracy of the tension measuring device shall be confirmed through calibration by an approved testing agency at least annually.
- c. Joint Assembly and Tightening of Shear/Bearing Connections: Bolts in connections not within the slip-critical category shall be installed in properly aligned holes, but need only be tightened to the snug tight condition. The snug tight condition is defined as the tightness that exists when all plies in a joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. If a slotted hole occurs in an outer ply, a flat hardened washer or common plate washer shall be installed over the slot.
- d. Joint Assembly and Tightening of Connections Requiring Full Pre-tensioning. Slip-critical connections shall be installed in properly aligned holes and tightened by one of the following methods.
 - 1) Turn-of-nut Tightening: When turn-of-nut tightening is used, hardened washers are not required except as specified in the AISC. A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension. The test shall demonstrate that the method of estimating the snug-tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than five percent greater than the tension required for slip-critical connections.

- 2) Installation of Alternate Design Bolts: A representative sample of not less than three bolts of each diameter, length and grade shall be checked at the job site in a device capable of indicating bolt tension. The test assembly shall include flat hardened washers, if required in the actual connection, arranged as in the actual connections to be tensioned. The calibration test shall demonstrate that each bolt develops a tension not less than five percent greater than the tension required by AISC. Manufacturer's installation procedure shall be followed for installation of bolts in the calibration device and in all connections. When alternate design features of the fasteners involve an irreversible mechanism such as yield or twist-off of an element, bolts shall be installed in all holes of the connection and initially brought to a snug tight condition. All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual fasteners. In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening.
- e. Mark bolts that have been completely tightened with an identifying symbol.

3.2. WELDING

- A. General: Quality of materials and design and fabrication of all welded connections shall conform to AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Building," "AWS Code for Welding in Building Construction," and requirements of this section. Where members and connections are noted in the construction documents as being part of the seismic lateral force resisting system (LFRS), the requirements of AWS D1.8 Structural Welding Code – Seismic Supplement shall apply.

Location and type of all welds shall be as shown. Make no other welded splices, except those shown on drawings, without prior approval of the architect.

- B. Automatic Welding: Use electrode wire and flux for automatic and semi-automatic welding acceptable to Structural Engineer. All methods, sequences, qualification and procedures, including preheating, and post heating if necessary, shall be detailed in writing and submitted to the Structural Engineer for review.
- C. Qualification of Welders:
1. Structural steel welding: Manual and automatic welds for structural steel construction shall be made only by operators who have been previous qualified by tests, as prescribed in AWS D1.1 to perform type of work required.
 2. Welders shall be checked by welding inspector. Those not doing satisfactory work may be removed, and may be required to pass qualification tests again. All qualification testing shall be at the Contractor's expense.
 3. Only welders whose weld procedures and pre-qualification by testing that have passed shall be considered qualified for such welds.
- D. Control cooling process after weld is completed by either step down post heat or thermal blankets as determined by procedures and prequalification.
- E. Box columns and built-up members shall have ultrasonic testing before and after welding.
- F. Flame cut surfaces shall be ground to remove contaminated steel layer to provide welds proper fusion without impurities.

- G. Preparation of surface: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint, and any other foreign material.
- H. Welding equipment: Welding equipment to be used in each case shall be acceptable to welding inspector. Use equipment with suitable devices to regulate speed, and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop, and to give adequate welding heat.
- I. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with fireproofing and architectural finishes.
- J. End-welded studs:
 - 1. Automatic end-welded studs: Automatically end-weld in accordance with the manufacturer's recommendations in such a manner as to provide complete fusion between the end of the stud and the plates. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch, and 3/16 inch for 3/4 inch diameter. Stud sizes indicated on drawings represent the finish stud height.
 - 2. Fillet-end welded studs: Studs may be welded using prequalified FCAW, GMAW, or SMAW processes provided the requirements of the AWS D1.1.
- K. Provide mill camber as shown on the construction documents within AISC tolerance. Place mill tolerance upward for all beams specified no camber.

3.3. ERECTION

- A. Structural steel erection: Comply with AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Building", latest edition.
- B. Erection Sequence: Erect steel in accordance with special erection sequences where special erection sequences are indicated on the contract documents.
- C. Before and during erection, keep all structural steel clean. Ship, handle and store steel in manner to avoid injury to members. Steel members showing evidence to rough handling or injury will be rejected.
- D. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.
- E. Provide sufficient bracing, shoring and guys to effect safe and satisfactory erection. Provide bracing and shoring capable of holding steel work plumb and properly aligned while field connections are being made, and until lateral force resisting elements are deemed by Architect capable of bracing structure. Temporary bracing shall be adequate to resist lateral forces from wind or seismic prior to the completion of the lateral resisting system.
- F. Set bearing and base plates with extreme care. Bring level, to line and grade with leveling plates or by leveling nuts and bolts. Grout solid under plates with a flowable non-shrink grout per Section 03 30 00 prior to applying vertical load.

- G. Field Assembly: Set structural framing accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

Shimming or other adjustments not indicated on drawings shall be approved by the Engineer prior to installation. Level and plumb individual members of the structure within specified AISC tolerances except as noted herein. Column shimming shall be 1/4 inch.

- H. All welds shall be full and clean, and conform to AISC and AWS specifications.
- I. Erection Tolerances: Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed 1 to 500 plus:
1. The maximum displacement of the center line of columns adjacent to elevator shafts, from the established column line, shall not be more than 1 inch at any point.
 2. In order to provide a true, flat plane for the exterior elevations, install all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building. Also install each vertical member on such grids so that its vertical center line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.
 3. All columns and beams shall adhere to Section M2.7 of the referenced "Specification for Structural Steel for Buildings" which states that completed members shall be free of twists, bends, and open joints. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.
- J. Temporary Flooring:
1. Provide planking and scaffolding necessary in connection with erection of structural steel, support of erection machinery, and construction materials. Temporary floors and use of steel shall be as required by applicable regulatory requirements.
 2. If steel decking is used as a working platform, it shall be temporarily tack-welded to supports to extent necessary for such use in accordance with applicable regulatory requirements. The concentrated loading from welding machines and other heavy machinery required for steel erection shall be distributed by planking or other approved means. Metal decking that becomes damaged as the result of being used as a working platform shall be replaced at no additional cost to the Owner.
- K. Tower Crane: The design for the support and bracing for a tower crane shall be the responsibility of the General Contractor. The design shall be prepared by a structural engineer licensed in the state of California. Drawings and calculations shall be stamped and signed by the structural engineer. Concentric, torsional, and/or eccentric loading to the main structure shall be resolved by the addition of structural steel for shear tabs, stiffeners, drag ties, bracing struts, etc., Such items shall be designed, detailed, furnished and installed by the contractor.

3.4. PAINTING AND CLEANING

- A. Prior to prime coat application, clean all loose rust, mill scale, oil, dirt, and all other materials from all steel to be left exposed. Use hand tool, power tool, sandblasting, chemical cleaning, and any other method necessary to provide a smooth, sound surface for painting.

B. Shop prime all steel except the following:

1. Steel encased in concrete.
2. Contact surfaces for slip-critical (sc) high strength bolts.
3. Areas within 4 inches of field welds.
4. Tops of members to receive metal decking.
5. Steel to be fireproofed.
6. Surfaces to be galvanized.

C. Use the following Type A shop painting systems on all normal environment interior steelwork:

1. Surface Preparation: SSPC-SP2 Hand Tool Cleaning or SSPC-SP3 Power Tool Cleaning. Where jobsite exposure is expected to exceed 6 months, SSPC-SP6 Commercial Blast Cleaning is required.
2. Application: Follow coating manufacturer's printed directions.
3. Material: Type A Tnemec Company, Inc., Series V10; Sherwin Williams Steel Spec Universal; Metal Case 94-231 Series or approved equal
4. Number of Coats: One
5. Dry Film Thickness: 2.0 mils minimum.
6. Volume Solids: 56.0 +/- 2.0% minimum
7. Generic Description: Modified Alkyd.

D. Unless noted otherwise in subsection H, use the following Type B shop painting systems on all exterior steelwork and interior steelwork subjected to wet conditions or fumes (see subsection H for additional requirements)

1. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning
2. Application: Follow coating manufacturer's printed directions.
3. Material: Type B Tnemec 90-97 Tneme-Zinc primer or approved equal
4. Number of Coats: One
5. Dry Film Thickness: 2.5 to 3.5 mils
6. Volume Solids: 63% +/- 2%
7. Generic Description: Zinc-Rich Urethane

E. Unless noted otherwise in subsection H, use the following finish painting systems on all exterior steelwork and interior steel work subjected to wet conditions or fumes (see subsection H for additional requirements):

1. Application: Follow coating manufacturer's printed directions. Apply over Type B primer system above.
 2. Material: Tnemec Series 750 UVX paint or approved equal
 3. Number of Coats: One
 4. Dry Film Thickness: 2.5 to 5 mils
 5. Volume Solids: 72% +/- 2%
 6. Generic Description: Polyfunctional Hybrid Polyurethane
- F. Primers and paints shall meet all federal and state environmental and air quality requirements.
- G. Apply two shop prime coats to areas which will be inaccessible after erection.
- H. All exterior steelwork and all interior steelwork subjected to wet conditions or fumes, including all welds, bolts, washers and other connection components, shall be primed and painted or hot-dip galvanized, as specified by the Architectural finish specifications. In the absence of Architectural finish specifications, all exterior steelwork and all interior steelwork subjected to wet conditions and fumes, including all welds, bolts, washers and other connection components, shall be hot-dip galvanized, conforming to the requirements set forth in ASTM A123/A123M and ASTM A153/A153M.
- I. Clean contact surfaces of high strength bolts of all burrs and material which might prevent solid seating of the parts. Steel to receive bolts shall be primer painted except beneath the contact area of slip-critical bolts.
- J. After erection, field touch up all welded areas, high strength bolts and damaged areas. For all steel to remain exposed, remove all blemishes, paint drips, and touch up prime coat.

3.5. HOISTING AND BRACING

- A. Provide all hoisting and erecting equipment and power.
- B. Provide and maintain any and all safety railings, toe boards, etc., required for the erection of steel framing and metal decking.
- C. Brace the erected frame in a manner which will assure safety and proper alignment to receive the metal decking and until the concrete slabs have been poured and have set.
- D. Erect building frame true and level. Erect columns in a manner to allow for movement due to welding shrinkage and thermal expansion and contraction of framing. Check plumbness after erection of each level. Maintain structural stability of frame during erection. Provide temporary bracing where necessary to maintain frame stability and to support required loads, including equipment and its operation.

END OF SECTION 05 12 00

SECTION 05 12 13

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Architecturally exposed structural steel, complete, as shown and specified.
- B. Work Specified Elsewhere:
 - 1. Finish Painting in the Field: Division 9
- C. Other Applicable Sections: Work of this Section is governed by applicable provisions of the following Sections:
 - 1. Section 05 12 00 - Structural Steel.

1.2 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC) 303-10: Section 10, Architecturally Exposed Structural Steel, Code of Standard Practice for Steel Buildings and Bridges.
- B. The Society for Protective Coatings (SSPC):
- C. SSPC Painting Manual, Volume

1.3 SUBMITTALS

- A. Product Data, Shop Drawings, and Certificates: As specified in Section 05 12 00.

1.4 PRODUCT HANDLING

- A. Delivery: Use special care in unloading items to protect surfaces and to prevent distortion and other damage.
- B. Storage: Under cover and off ground.
- C. Protection: Protect items until erected and accepted.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. General: Provide for structural steel where marked AESS or ARCHITECTURALLY EXPOSED STRUCTURAL STEEL. Comply with more stringent requirements of Section 05 12 00 and Reference Standard, except as follows.
- B. Quality: Smooth, clean, sound, free from surface defects, handling marks, die or roller marks, pits, mill scale, rust, pitting left by rust removal, cracks, laminations, and slag inclusions.
- C. Tubes and Pipes: Seamless type.
- D. Stainless Steel: 300 Series, non-magnetic stainless steel.
- E. Manufacture: Use only members which have been manufactured not longer than 6 months prior to fabrication.

2.2 FABRICATION

- A. General: Comply with more stringent requirements of Section 05 12 00 and Reference Standards, except as follows.
- B. Connections: Fabricate shear plates and beam flanges and webs at connections as shown.
- C. Bolts: Hexagonal head.
- D. Welds: Grind and polish every weld smooth and uniform, unless otherwise noted. Grind butt welds and welds at external corners flush and smooth. Completely remove back-up bars, weld spatter, and run-off tabs where exposed to view. Fill web cutouts at backup bars. Weld show-through not acceptable.
- E. Marks: Manufacturer's names and identification marks not permitted on exposed surfaces. Do not apply erection marks, symbols, or painted notes to exposed surfaces.

2.3 SHOP PAINTING

- A. General: Prepare surfaces and apply materials to concealed and exposed surfaces per coating system manufacturer's recommendations. Coordinate prime coat with body and finish coats.
- B. Surface Preparation:
 - 1. Steel: Remove oil and grease with volatile solvents per SSPC SP-1 and commercial blast clean per SSPC SP-6/NACE No. 3. Apply prime coat before rust bloom appears, but not more than 8 hours after cleaning.
 - 2. Stainless Steel: Remove oil and grease with volatile solvents per SSPC SP-1 and scarify surfaces.

C. Exterior Work:

1. Shop Priming – All structural exterior steel shall be shop-primed per the requirements in Section 09 90 00, “Painting”.

D. Interior Work:

1. Shop Priming – All structural interior steel shall be shop-primed per the requirements in Section 09 90 00, “Painting”.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Before starting work, examine adjoining work on which execution is in any way dependant for workmanship and fit. Give written notification of any existing deficiencies detrimental to proper and timely installation of work under this Section. Do not proceed until conditions are satisfactory.

3.2 ERECTION

- A. General: As specified under Section 05 12 00.

3.3 CONNECTIONS

- A. General: As specified under Section 05 12 00, except as modified under Paragraph Fabrication of this Section.
- B. Bolts: Orient heads in same direction.

3.4 FIELD QUALITY CONTROL

- A. General: As specified under Section 05 12 00.

3.5 FIELD TOUCH-UP OF SHOP PAINTED SURFACES

- A. General: As specified under Section 05 12 00 and Section 09 90 00, except at Contractor’s option, preparation for tough-up by SSPC-SP-11 may be substituted for SSPC-SP-6.

END OF SECTION

SECTION 05 30 00

METAL DECKING

PART 1 - GENERAL

1.1. GENERAL REQUIREMENTS

- A. The requirements of Division 1 apply to all Work of this Section.

1.2. SCOPE

- A. Provide all steel decking, accessories and cutting and reinforcing of all holes as indicated on Drawings and specified here.

1.3. RELATED WORK (See also Table of Contents):

- A. Cast-in-place concrete: Section 03 30 00.
- B. Structural Steel: Section 05 12 00.
- C. Metal Fabrications: Section 05 50 00.
- D. Holes for Mechanical and Electrical Work: Divisions 21, 22, and 26.
 - 1. Cutting and reinforcing of holes for plumbing and electrical conduits shall be part of this work providing holes are located by the mechanical and electrical contractors prior to or during installation. Cutting and reinforcing of holes after installation shall be the responsibility of those trades requiring them.
 - 2. Miscellaneous connection requirements for Mechanical and Electrical Work: Divisions 21, 22 and 26.

1.4. QUALITY ASSURANCE

- A. Standards and References: (Latest Edition unless otherwise noted)
 - 1. California Building Code (CBC), with State of California Amendments
 - 2. American Iron and Steel Institute (AISI). "Specification for the Design of Cold-Formed Steel Structural Members."
 - 3. American Welding Society (AWS): AWS D-1.3 "Structural Welding Code - Sheet Steel".
- B. Submittals: (Submit under Provisions of Section 01 33 00)

1. Shop Drawings. Submittal required. Indicate deck sheet layout and all installation details. Contract documents may not be used as shop drawings.
2. Manufacturer's specifications for each Deck Type. Submittal required.
3. Certification: Provide affidavits from the manufacturer listing mill test certificates by number for each size and type of decking.
4. Manufacturer shall provide affidavits of approval by the International Code Council Evaluation Service (ICC-ES) for the metal decking shapes proposed.
5. Floor areas to receive concrete fill over metal deck: Provide a work plan detailing the means and methods to be used for placement of concrete, including screeding procedures and locations of any construction joints, which will achieve the performance criteria noted in Section 2.1. A pre-construction meeting shall be scheduled by the General Contractor, to include the concrete sub-contractor, Architect, Structural Engineer, and Owner's Representative to discuss the work plan and performance objectives.

C. Tests and Inspections:

1. Provide special inspections and testing as described in the "Statement of Structural Special Inspections and Testing" within the structural drawings and as required by this section.
2. A testing program is required prior to start of construction. Testing program to be done In Compliance with the CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
3. All materials, methods and equipment shall be subject to inspections by the Testing Laboratory at any time.
4. Material Testing: Test reports establishing conformity to the specifications shall be furnished to the Owner for each heat prior to installation.
5. Welding Inspection: Welding of metal deck shall be performed under the inspection of the Testing Laboratory. Inspection shall be in accordance with SDI QA/QC.
6. Powder Actuated Fasteners (shotpins): Where decking is attached with shotpins, the pins shall be inspected for proper installation by a special inspector. Twenty-five percent (25%) of all pins shall be verified using the inspection tool supplied by Hilti Inc.

1.5. PRODUCT HANDLING

- A. Protect metal decking before installation and protect the installed work and materials of other trades.

PART 2 - PRODUCTS

College of Alameda Transportation Technology

Project No. 20-175

Issue Date:

Revision Date:

2.1. GENERAL REQUIREMENTS - DECK SYSTEMS

- A. Acceptable Manufacturers:
 - 1. ASC Steel Deck (IAPMO UES Report No. 0161 & 0329).
 - 2. Manufacturers of materials are indicated to set a standard for design and product performances.
 - 3. Subject to the requirements of Division 1, products of manufacturers not indicated may be proposed for substitution, provided that they are equal in design, product performance and warranty to the products specified and have ICBO approval.
 - 4. The burden of proof of equality of proposed products is on the Contractor.
- B. Provide deck sections, type and gage as indicated on the drawings. Other manufacturers producing deck complying with these Specifications, and having equivalent properties and dimensions will be subject to the Architect's review upon submission of substantiating data, and may be used only if equivalent to deck sections specified, in the Architect's opinion.
- C. All deck units shall be approved by International Code Council Evaluation Service (ICC-ES) for use as a diaphragm.
 - 1. Diaphragm shear capacities shall be comparable (within 5%) to those listed on the drawings for the deck, welding, and spans indicated.
- D. Units shall be in lengths to span two or more supports. Where steel layout does not permit two-span minimums, notify the Structural Engineer prior to fabrication.
- E. All deck units shall have male and female interlocking side joints.
- F. All deck units with concrete or insulating concrete shall be vented to provide 1% open area.
- G. Prior to covering or filling with insulation, roofing, or placing concrete over metal decking, verify and coordinate installation requirements of suspended metal framing, suspended acoustical ceiling systems, mechanical and electrical work or other items as required. Provide inserts, clips, anchors or fasteners as indicated or as otherwise required to provide for the complete and proper installation of suspended items from the metal deck.
 - 1. Verify and coordinate locations, patterns, spacing, etc. of suspension members and connectors required by other Sections of the Specifications and as shown on drawings.
 - 2. Where suspension or hanger wires are required under other Sections, verify and coordinate locations, patterns, spacings, etc. with the appropriate trade. Drill holes at bottom of deck flutes of sufficient size to pass support wires. Wire supports shall be looped and secured with a minimum of three (3) tight turns around a minimum 1-1/2" x 8" long furring channel or No. 3 x 12" long reinforcing bar centered above the hole and laid in the deck flutes. Pig-tail loops into the concrete will not be permitted unless approved by the General Contractor. Place no wires in flute with side lap.

3. At unfilled metal deck or as otherwise indicated, required or shown, provide individual 18 gauge by 1-1/2" wide galvanized hanger tabs 6" long and having 2" round holes for attaching tie wires. Tabs shall be hooked over male portion of each edge joint at 16" on center before female joint of next sheet is placed over it. As an alternate, #3x12" long reinforcing bars centered above the hole and laid in the deck flutes may be used. No loading other than suspended ceilings may be suspended from metal deck without concrete fill. Suspend all piping, ducting, conduit and equipment from steel beams.

H. Structural Properties: Deck shall have minimum structural properties as indicated on Structural Drawings.

I. Accessories to be furnished shall include the following:

1. Cell closures where shown on Drawings.
2. Light gauge plate fillers attached to deck to provide an uninterrupted roof plane.
3. Drain sumps and/or roof drain mounting plates as detailed.
4. Cell end closures column flashing and miscellaneous closures to prevent concrete leakage.
5. Miscellaneous accessories incidental to erection of deck.

J. At concrete filled metal deck floors:

1. The final top of concrete elevation shall not deviate by more than 3/8" above or below the top of concrete elevation noted on plan.
2. Floor flatness for concrete over metal deck shall conform to ACI 117. Unless stricter requirements are specified by the Architect, floor flatness for the completed overall floor area shall meet the following minimum values:

Specified Overall Value for Flatness (SOF_F): 25

Minimum Local Value for Flatness (MLF_F): 17

Areas of non-compliance shall be reviewed by the Owner and Architect and may require additional floor leveling or grinding. The cost of any remedial action shall be borne by the Contractor.

3. In no case shall the depth of concrete over metal deck be less than that specified on plan. Note that the concrete depth will vary due to deck and beam deflections during concrete placement, and shall be considered in the estimating of concrete volume, cost and placement strategies.

K. At concrete filled metal deck roofs:

1. Concrete over metal deck at roofs shall be placed to maintain the design thickness specified on plan at all locations within the roof area. Additional concrete (ponding) which increases the thickness above the design thickness to achieve flatness, levelness or maintain roof slope should not be provided.

2.2. MATERIALS

- A. Provide deck of type and gage shown on the drawings. Deck units and all necessary items shall be formed from steel sheets conforming to ASTM-A653, structural quality. The steel sheets shall have received, before being formed, a metal protective coating of zinc conforming to ASTM-A653 Class G60 coating.
- B. Powder Actuated Fasteners (shotpins): Where decking is attached with shotpins, they shall be by Hilti Inc., of the type indicated on the drawings and ICC-ES approved for use in a diaphragm.
- C. Welding rods: E60XX minimum.

PART 3 – EXECUTION

3.1. INSPECTION

- A. Examine areas to receive work specified. Do not begin work until underlying work is complete, all required inspections have been made, and all conditions which might prevent proper installation or impair performance of work have been corrected.
- B. Beginning installation means accepting conditions of underlying work.
- C. If supporting steel work is not properly aligned or sufficiently level to permit proper bearing of metal decking, such deficiency shall be corrected by the Contractor before placing units.

3.2. ERECTION

- A. Deck shall be laid true to line, shall conform to profile shown on Drawings, and shall be without deformations, creases, wrinkles or noticeable defects.
- B. Connections: Deck shall be secured to structural frame by use of 15/16" visible diameter (1/2" effective diameter) fusion welds. Minimum number and spacing of connections shall be as indicated on Structural Drawings.
- C. The metal deck shall be fastened to all structural members both parallel and perpendicular. Spread deck and modify layout where structural members are parallel to the metal deck ribs.
- D. Bend decking to conform to slopes and warps as required for solid contact to framing that allows proper welding.
- E. Shoring for metal decking shall be provided by the contractor as required and as indicated in the corresponding ICC-ES report. Coordinate shoring requirements for construction live load (and concrete placement) with the manufacturer.
- F. All deck units shall break over beams.
- G. Provide low ribs at all beams parallel to deck. As an alternate, the deck may be broken and infilled with a flat pan to provide deck welding to parallel beams.

- H. Butt deck units tight over steel beams.
- I. Provide $\frac{3}{4}$ " clear concrete cover around all welded studs.

3.3. DEFECTIVE DECK

- A. Units of decking that become deformed or damaged to such extent that they are weakened or unsuitable for use shall be removed and replaced at no cost to the Owner.

3.4. TOUCH UP AND CLEANING

- A. All welds and abrasions on deck surfaces not covered by concrete shall be touched up using a zinc dust-zinc oxide primer.
- B. Burn spots on supporting exposed steel shall be touched up with same primer as used on adjacent surface.
- C. Clean surfaces of installed deck by effective means to receive sprayed-on fireproofing or finish painting as indicated.

END OF SECTION 05 30 00

SECTION 05 34 00

ACOUSTICAL METAL DECKING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

- A. Provide all steel decking, accessories and cutting and reinforcing of all holes as indicated on Drawings and specified here.

1.3 RELATED WORK (See also Table of Contents):

- A. Cast-in-place concrete: Section 03 30 00.
- B. Structural Steel: Section 05 12 00.
- C. Metal Fabrications: Section 05 50 00.
- D. Holes for Mechanical and Electrical Work: Divisions 21, 22, and 26.
 - 1. Cutting and reinforcing of holes for plumbing and electrical conduits shall be part of this work providing holes are located by the mechanical and electrical contractors prior to or during installation. Cutting and reinforcing of holes after installation shall be the responsibility of those trades requiring them.
 - 2. Miscellaneous connection requirements for Mechanical and Electrical Work: Divisions 21, 22 and 26.

1.4 REFERENCES (Latest Edition Unless Otherwise Noted)

- A. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. California Building Code (CBC), with State of California Amendments.
- C. American Iron and Steel Institute (AISI). "Specification for the Design of Cold-Formed Steel Structural Members."
- D. ANSI/SDI QA/QC - Standard for Quality Control and Quality Assurance for Installation of Steel Deck.
- E. American Welding Society (AWS): AWS D-1.3 "Structural Welding Code - Sheet Steel".

- F. International Code Council Evaluation Service (ICC-ES).
- G. “Statement of Structural Special Inspections and Testing” within the structural drawings, DSA Form 103.

1.5 SUBMITTALS:

- A. Shop Drawings. Submittal required. Indicate deck sheet layout and all installation details. Contract documents may not be used as shop drawings.
- B. Manufacturer's specifications for each Deck Type. Submittal required.
- C. Certification: Provide affidavits from the manufacturer listing mill test certificates by number for each size and type of decking.
- D. Manufacturer shall provide affidavits of approval by the International Code Council Evaluation Service (ICC-ES) for the metal decking shapes proposed.
- E. Floor areas to receive concrete fill over metal deck: Provide a work plan detailing the means and methods to be used for placement of concrete, including screeding procedures and locations of any construction joints, which will achieve the performance criteria noted in Section 2.1. A pre-construction meeting shall be scheduled by the General Contractor, to include the concrete sub-contractor, Architect, Structural Engineer, and Owner’s Representative to discuss the work plan and performance objectives.

1.6 TESTS AND INSPECTIONS:

- A. Provide special inspections and testing as described in the “Statement of Structural Special Inspections and Testing” within the structural drawings, DSA Form 103 and as required by this section.
- B. A testing program is required prior to start of construction. Testing program to be done In Compliance with the CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
- C. All materials, methods and equipment shall be subject to inspections by the Testing Laboratory at any time.
- D. Material Testing: Test reports establishing conformity to the specifications shall be furnished to the Owner for each heat prior to installation.
- E. Welding Inspection: Welding of metal deck shall be performed under the inspection of the Testing Laboratory. Inspection shall be in accordance with SDI QA/QC.
- F. Powder Actuated Fasteners (shotpins): Where decking is attached with shotpins, the pins shall be inspected for proper installation by a special inspector. Twenty-five percent (25%) of all pins shall be verified using the inspection tool supplied by Hilti Inc.

1.7 PRODUCT HANDLING

- A. Protect metal decking before installation and protect the installed work and materials of other trades.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS - DECK SYSTEMS

- A. Acceptable Manufacturers:
 - 1. ASC Acustadek -report reference is IAPMO UES Report No. 0161.or approved equal.
 - 2. Manufacturers of materials are indicated to set a standard for design and product performances.
 - 3. Subject to the requirements of Division 1, products of manufacturers not indicated may be proposed for substitution, provided that they are equal in design, product performance and warranty to the products specified and have ICBO approval.
 - 4. The burden of proof of equality of proposed products is on the Contractor.
 - 5. Substitutions per Section 01 62 00, "Product Options"
- B. Provide deck sections, type and gage as indicated on the drawings. Other manufacturers producing deck complying with these Specifications and having equivalent properties and dimensions will be subject to the Architect's review upon submission of substantiating data and may be used only if equivalent to deck sections specified, in the Architect's opinion.
- C. All deck units shall be approved by International Code Council Evaluation Service (ICC-ES) for use as a diaphragm.
 - 1. Diaphragm shear capacities shall be comparable (within 5%) to those listed on the drawings for the deck, welding, and spans indicated.
- D. Units shall be in lengths to span two or more supports. Where steel layout does not permit two-span minimums, notify the Structural Engineer prior to fabrication.
- E. For limitations of loads to metal decking see drawings
- F. All deck units shall have male and female interlocking side joints.
- G. All deck units with concrete or insulating concrete shall be vented to provide 1% open area.
- H. Prior to covering or filling with insulation, roofing, or placing concrete over metal decking, verify and coordinate installation requirements of suspended metal framing, suspended acoustical ceiling systems, mechanical and electrical work or other items as required. Provide

inserts, clips, anchors or fasteners as indicated or as otherwise required to provide for the complete and proper installation of suspended items from the metal deck.

1. Verify and coordinate locations, patterns, spacing, etc. of suspension members and connectors required by other Sections of the Specifications and as shown on drawings.
 2. Where suspension or hanger wires are required under other Sections, verify and coordinate locations, patterns, spacings, etc. with the appropriate trade. Drill holes at bottom of deck flutes of sufficient size to pass support wires. Wire supports shall be looped and secured with a minimum of three (3) tight turns around a minimum 1-1/2" x 8" long furring channel or No. 3 x 12" long reinforcing bar centered above the hole and laid in the deck flutes. Pig-tail loops into the concrete will not be permitted unless approved by the General Contractor. Place no wires in flute with side lap.
 3. At unfilled metal deck or as otherwise indicated, required or shown, provide individual 18 gauge by 1-1/2" wide galvanized hanger tabs 6" long and having 2" round holes for attaching tie wires. Tabs shall be hooked over male portion of each edge joint at 16" on center before female joint of next sheet is placed over it. As an alternate, #3x12" long reinforcing bars centered above the hole and laid in the deck flutes may be used. No loading other than suspended ceilings may be suspended from metal deck without concrete fill. Suspend all piping, ducting, conduit and equipment from steel beams.
- I. Structural Properties: Deck shall have minimum structural properties as indicated on Structural Drawings.
- J. Accessories to be furnished shall include the following:
1. Cell closures where shown on Drawings.
 2. Light gauge plate fillers attached to deck to provide an uninterrupted roof plane.
 3. Drain sumps and/or roof drain mounting plates as detailed.
 4. Cell end closures column flashing and miscellaneous closures to prevent concrete leakage.
 5. Miscellaneous accessories incidental to erection of deck.

2.2 MATERIALS

- A. Provide deck of type and gage shown on the drawings. Deck units and all necessary items shall be formed from steel sheets conforming to ASTM A653, structural quality. The steel sheets shall have received, before being formed, a metal protective coating of zinc conforming to ASTM A653, Class G60 coating.
- B. Powder Actuated Fasteners (shotpins): Where decking is attached with shotpins, they shall be by Hilti Inc., of the type indicated on the drawings and ICC-ES approved for use in a diaphragm.
- C. Welding rods: E60XX minimum.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas to receive work specified. Do not begin work until underlying work is complete, all required inspections have been made, and all conditions which might prevent proper installation or impair performance of work have been corrected.
- B. Beginning installation means accepting conditions of underlying work.
- C. If supporting steel work is not properly aligned or sufficiently level to permit proper bearing of metal decking, such deficiency shall be corrected by the Contractor before placing units.

3.2 ERECTION

- A. Deck shall be laid true to line, shall conform to profile shown on Drawings, and shall be without deformations, creases, wrinkles or noticeable defects.
- B. Connections: Deck shall be secured to structural frame by use of 15/16" visible diameter (1/2" effective diameter) fusion welds. Minimum number and spacing of connections shall be as indicated on Structural Drawings.
- C. The metal deck shall be fastened to all structural members both parallel and perpendicular. Spread deck and modify layout where structural members are parallel to the metal deck ribs.
- D. Bend decking to conform to slopes and warps as required for solid contact to framing that allows proper welding.
- E. Shoring for metal decking shall be provided by the contractor as required and as indicated in the corresponding ICC-ES report. Coordinate shoring requirements for construction live load (and concrete placement) with the manufacturer.
- F. All deck units shall break over beams.
- G. Provide low ribs at all beams parallel to deck. As an alternate, the deck may be broken and infilled with a flat pan to provide deck welding to parallel beams.
- H. Butt deck units tight over steel beams.
- I. Provide 3/4" clear concrete cover around all welded studs.

3.3 DEFECTIVE DECK

- A. Units of decking that become deformed or damaged to such extent that they are weakened or unsuitable for use shall be removed and replaced at no cost to the Owner.

3.4 TOUCH UP AND CLEANING

- A. All welds and abrasions on deck surfaces not covered by concrete shall be touched up using a zinc dust-zinc oxide primer.
- B. Burn spots on supporting exposed steel shall be touched up with same primer as used on adjacent surface.
- C. Clean surfaces of installed deck by effective means to receive sprayed-on fireproofing or finish painting as indicated.

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1. GENERAL REQUIREMENTS

- A. The requirements of Division 1 apply to all Work in the Section.

1.2. SCOPE

- A. Furnish and install all components and related items pertaining to cold-formed metal framing systems.

1.3. RELATED WORK SPECIFIED ELSEWHERE (See also Table of Contents)

- A. Cast-in-place concrete: Section 03 30 00.
- B. Structural Steel: Section 05 12 00.
- C. Metal Deck: Section 05 30 00.
- D. Painting: Section 09 90 00

1.1 STANDARDS AND REFERENCES: (Latest Edition Unless Noted Otherwise)

- A. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members
- C. American Welding Society (AWS) D1.3
- D. 2019 California Building Code (CBC), with State of California Amendments
- E. Framing components shall conform to Standards of the Steel Stud Manufacturers Association (ICC-ES ER-3064P).
- F. Steel Stud Manufacturer's Association (SSMA)

1.2 QUALITY ASSURANCE

- A. General:

1. Welders: Qualified for welding in horizontal, vertical, and overhead positions in accordance with AWS D1.3.
2. Wall system shall provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperatures.
3. Wall system shall accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.5. DELIVERY, STORAGE, AND HANDLING

- A. Protect metal framing units from rusting and damage.
- B. Deliver to Project site in manufacturer's unopened containers or bundles, identified with name, brand, type and grade.
- C. Store off ground in a dry ventilated space or protect with suitable waterproof covering.

PART 2 - PRODUCTS

2.1. ACCEPTED MANUFACTURERS

- A. Members of the Steel Stud Manufacturer's Association (SSMA), or approved equal.

2.2. METAL FRAMING

- A. System Components: Provide steel studs, joists, tracks, straps, runners, blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as shown on the Drawings for applications indicated. All studs, joists, tracks, and blocking shall conform to ICC-ES ER-3064P.
- B. Materials and Finishes:
 1. 54 Mils (16 Gauge) and Thicker: Fabricate metal framing components of structural quality (SQ) steel sheet with a minimum yield point of 50,000-psi, conforming to ASTM A653, SS Grade 50 Class 1 or ASTM A1003, Grade 50 Type H (ST50H).
 2. 43 Mils (18 Gauge) and Thinner: Fabricate metal framing components of structural quality (SQ) steel sheet with a minimum yield point of 33,000-psi, conforming to ASTM A653, SS Grade 33 or ASTM A1003, Grade 33 Type H (ST33H).
 3. Finish: Galvanized complying with ASTM A653, G60. Finish accessories to match main framing components.
 4. Exposed Exterior Framing: Galvanized complying with ASTM A653, G90. 0.45 oz/ft² or about 0.76 mils per side Finish accessories to match main framing components.
- C. See drawings for section properties and details.

- D. Studs and joists shall be of the size, shape, and gauge indicated, with a flange and flange return lip as shown on the Structural Drawings.
- E. Welding Electrodes: E60XX (43 Mil material and thinner), E70XX (54 Mil material and thicker)
- F. Galvanizing Repair Paint: High zinc-dust content paint for repair of galvanized surfaces damaged by welding.
- G. Material Thickness: All sections are to be roll formed in various depths with the following minimum bare metal thicknesses:

Minimum Thickness (inch)	Minimum Design Thickness (inch)	Gauge	Mils
0.0179	0.0188	25	18
0.0329	0.0346	20	33
0.0428	0.0451	18	43
0.0538	0.0566	16	54
0.0677	0.0713	14	68
0.0966	0.1017	12	97
0.1180	0.1240	10	118

PART 3 - EXECUTION

3.1. INSTALLATION

- A. Install metal framing systems in accordance with the Structural Drawings. Where drawings conflict with manufacturer’s recommendations, the Structural Drawings will govern.
- B. Runner Tracks:
 - 1. Install continuous tracks sized to match studs. See Structural Drawings.
 - 2. Align at base and tops of studs.
 - 3. Attach tracks with screws, welding, bolting or shotpins as indicated on the Structural Drawings.
 - 4. Fasten corners and ends of tracks as shown.
- C. Studs:
 - 1. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces.
 - 2. Where studs abut structural columns or walls, anchor ends of stiffeners to supporting structure.
 - 3. Secure studs to top and bottom runner tracks by screw fastening at both flanges.

4. Install studs in one piece for full height; splicing of studs is not permitted.
5. Provide deflection allowance of 1/2" minimum in stud track, directly below horizontal building framing for all non-bearing wall framing. See Structural Drawings.
6. Install ends of studs tight to web of track at all bearing wall framing. Compress track against end of stud as required to achieve tight fit prior to installation of stud to track screw attachments. See Structural Drawings.
7. Install supplementary backing and bracing wherever walls or partitions are indicated to support equipment, services, casework, heavy trim and furnishings and similar work requiring attachment to wall or partition. Comply with stud manufacturer's instructions and industry standards.
8. See Structural Drawings for opening framing.
 9. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.
 10. Install one row of metal blocking or bridging at mid-height of all studs over 10'-0" in height in addition to bracing that may be required at studs that do not receive sheathing (see item 11 below).
 11. Install strapping to all sides of studs that do not receive sheathing as indicated on the structural drawings.

3.2. TOUCH-UP PAINTING

- A. Touch-up shop-applied protective coatings damaged during handling and installation.
- B. Use compatible primer for prime coated surfaces; use galvanizing repair paint for galvanized surfaces.
- C. See Section 09 91 00 – Painting for shop-applied coatings.

END OF SECTION 05 40 00

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1. SUMMARY

- A. Shop fabricated metal items and miscellaneous metal work.
- B. Refer to Schedule at end of this Section.

1.2. RELATED SECTIONS:

- A. Section 05 12 00 - Structural Steel
- B. Section 05 51 33 - Metal Ladders
- C. Section 09 91 00 - Painting - Interior and Exterior
- D. Section 09 96 00 - High Performance Coatings

1.3. STANDARDS AND REFERENCES: (Latest Edition Unless Noted Otherwise)

- A. ASTM A36 / A36M - Standard Specification for Carbon Structural Steel
- B. ASTM A53 / A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- C. ASTM A123 / A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- D. ASTM A283 / A283M – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
- E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
- F. ASTM A500 / A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- G. ASTM A653 / A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

- H. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction
- I. AWS A2.0 - Standard Welding Symbols.
- J. AWS D1.1 - Structural Welding Code.
- K. CCR, Title 24, 2018 ICC, With State of California Amendments – 2019 California Building Code (CBC), Part 2, Vols. 1 and 2.

1.1 SUBMITTALS:

- A. Submittals: Provide submittals per Section 01 33 00, “Submittal Procedures”.
- B. Product Data: Provide data on material, finishes and attachment.
- C. Shop Drawings: Submit shop drawings indicating profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevation, and details where applicable. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.
- D. Verify that field measurements are as indicated on shop drawings.
- E. Manufacturer's descriptive data: Submit for manufacturer's items.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- B. Staff:
 - 1. Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.
 - 2. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.
- C. Welders’ Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Deliver all parts ready for erection; store in close proximity to final locations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plates and Bars: ASTM A283 / A283M, Grade D or approved equal.
- B. Steel Sections: Channels, plates, angles, etc. ASTM A36 / A36M.
- C. Steel Tubing: ASTM A500 / A500M, Grade B.
- D. Steel Pipe: ASTM A53 / A53M, Type E or S, Grade. B.
- E. Sheet Steel: ASTM A653 / A653M, gage and profile indicated, galvanized to G90 finish in accordance with ASTM A653 / A653M.
- F. Downspouts: 3” diameter, steel pipe, ASTM A53 / A53M, Grade B, Schedule 40, galvanized, unless otherwise shown or specified.
- G. Steel Bolts, Nuts, and Washers: ASTM A307.
- H. Welding Materials: AWS D1.1; type required for materials being welded.
 - 1. Solder: 50% pig lead and 50% block tin.
 - 2. Flux: Rosin, muriatic acid neutralized with zinc or an approved soldering paste.
- I. Galvanizing: Hot-dip process ASTM A123 / A123M typical and ASTM A123 / A123M for threaded fasteners performed after fabrication into largest practical section. Weight of coating not less than 2 oz. per sq. ft. of surface. Where damaged, repair surface with one coat of hot process galvanizing repair compound, "Galvalloy", Galvweldalloy", or approved equal.
- J. Primer: All metal fabrications shall be shop-primed per the requirements in Section 09 90 00, "Painting".
- K. Dissimilar Materials: Separate dissimilar surfaces in contact with or in close proximity to non-compatible metals, concrete masonry, or plaster with neoprene gasket; or other approved means.
- L. Expansion Bolts: Hilti "Kwik Bolt TZ2" Expansion Anchor Bolts, galvanized unless otherwise indicated.

Product Website Link:

https://www.hilti.com/c/CLS_FASTENER_7135/CLS_WEDGE_ANCHORS_7135/r8863215

- M. Non-shrink Grout: Master Builders, MasterFlow 928, or equal.

Product Website Link: <https://www.master-builders-solutions.com/en-us/products/grouts/cementitious-grouts/masterflow-928>

N. Substitutions: Provide per Section 01 25 00, "Substitution Procedures"

2.2 FABRICATION

- A. Verify dimensions on site prior to shop fabrication.
- B. Fabricate items with joints tightly fitted and secured.
- C. Fit and shop assemble in largest practical sections, for delivery to jobsite.
- D. Grind exposed welds flush and smooth adjacent finished surfaces. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- F. Make exposed joints butt tight, flush and hairline.
- G. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.
- H. BOLLARDS
 - 1. Pipe Bollards shall be Schedule 40 with a hot dip galvanized finish. Size as indicated on drawings.
 - 2. Provide welded domed cap on all bollards unless indicated otherwise. Include a hot dip galvanized Schedule 40 embedded sleeve in footing and lock hasp at grade for removable bollards as indicated on drawings.
 - 3. Provide a pair of 2" reflective epoxy paint halos at the top of each bollard.
 - 4. Fixed Bollards:
 - a. Pipe Size: Three point five (3.5) – four point five (4.5) inches outside diameter.
 - b. Cap: Round.
 - c. Finish: Factory applied marine grade powder coat finish, color should be easily visible in daylight and night, color shall be approved by district.
 - d. Height Above Finished Grade: Thirty-six inches (36").
 - e. Foundation: Thirty-three (33) inches concrete footing twelve (12) inches in diameter.
 - 5. Removable Bollards:
 - (a) Pipe Size: Three point five (3.5) – four point five (4.5) inches outside diameter.

- b) Weight: Not-to-exceed forty (40) pounds
- c) Cap: Round.
- d) Finish: Factory applied marine grade powder coat finish, color should be easily visible in daylight and night, color shall be approved by District.
- e) Height Above Finished Grade: Thirty-six inches (36”).
- f) Foundation: Thirty-three (33) inches concrete footing twelve (12) inches in diameter.
- g) Key and Lock: Padlock to be provided by Owner.

I SAFETY TIE OFFS

1. CB-1-B - Bolt-On Wall Anchor

Product Website Link: <https://www.guardianfall.com/performance-safety-products/anchor-points/product/cb-1-b-bolt-on-wall-anchor>

2 Roof Top Safety Tie Off : See 5/A4.4.3

Product Website Link : <https://www.guardianfall.com/performance-safety-products/anchor-points/product/cb-12-weld-on-post>

Applicable Standards: OSHA 1910 & OSHA 1926 Subpart M Hot-dipped galvanized steel shall conform with ASTM A123/123M and ANSI Z359.18-17, and ANSI A10.32-12.

I. Perforated Panels:

Basis of Design:

McNichols Metal, Perforated Metal, Round, Carbon Steel, Cold Rolled, Mill Finish, 16 Gauge (.0598" Thick), 3/8" Round on 1/2" Staggered Centers, 1/8" Bar Width, 4.62 Holes Per Square Inch (HPSI), Minimum Solid Margins Both Sides of Sheet Parallel to Length of Sheet, Holes Sheared Through Both Ends of Sheet Parallel to Width of Sheet, 51% Open Area, Item 1638121648, or equal

Product website: <https://www.mcnichols.com/perforated-metal/round-hole/carbon-steel-cs->

[16381216?rbl=2669278197&cId=103](https://www.ces.ncsu.edu/curriculum/16381216?rbl=2669278197&cId=103)

K. Substitutions: Provide per Section 01 25 00, "Substitution Procedures"

a) FINISH

- (1) Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- (2) Do not prime surfaces in direct contact bond with concrete or where field welding is required.
- (3) Prime paint interior items as described in Section 09 90 00, "Painting".
- (4) Galvanize exterior items and scheduled interior items to minimum 2.00 oz/sq ft zinc coating.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Obtain Architect's approval prior to site cutting or making adjustments not scheduled.
- B. Clean and strip primed steel items to bare metal where site welding is scheduled.
- C. Make provision for erection loads with temporary bracing. Keep work in alignment.
- D. Supply items required to be cast into concrete with setting templates, for installation under appropriate Sections.
- E. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.
- F. Do not begin installation until supporting structure is complete and installation will not interfere with supporting structure work.
- G. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.2 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Perform field welding in accordance with AWS D1.1.
- C. After installation, touch-up field welds, scratched or damaged surfaces with primer, except repair exposed galvanized work (not to be painted) with hot process field galvanizing, in accord with manufacturer's published directions.

3.3 SCHEDULE Provide and install items listed in Schedule and shown on Drawings with anchorage and attachment necessary for installation. The following Schedule lists principal items only. Refer to drawing details for items not specifically scheduled.

1. Miscellaneous plates or angles not attached to structural steel; complete with anchorage for embedment.
2. Steel Fabricated Ladders
3. 3" Dia., SCH 40 Downspouts.
4. Exterior Screens.
5. Perforated Panels at Exterior Fencing
6. Galvanized metal pipe bollards.
7. Other Misc. Metal Fabrications indicated in drawings, not specifically described.

END OF SECTION

SECTION 05 51 13
METAL PAN STAIRS

PART 1 - GENERAL

1.1 SUMMARY

- A. Concrete filled steel stairs and landings.
- B. Miscellaneous fabricated ferrous metal items associated with stair assemblies.
- C. Miscellaneous fabricated structural connectors and clips associated with stair assemblies

1.2 RELATED SECTIONS:

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 09 91 00 - Painting - Interior and Exterior Work may be required to be coordinated with other sections

1.3 REFERENCES

- A. ASTM A36 / A36M - Standard Specification for Carbon Structural Steel
- B. ASTM A53 / A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- C. ASTM 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- A. ASTM A123 / A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- B. ASTM A153 / A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- C. ASTM A283 / A283M – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
- E. ASTM A322 - Standard Specification for Steel Bars, Alloy, Standard Grades
- F. ASTM A500 / A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

- G. ASTM A653 / A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- H. ASTM A1011 / A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- I. AWS A2.0 - Standard Welding Symbols.
- I. AWS D1.1 - Structural Welding Code.
- J. SSPC - Steel Structures Painting Council.

1.4 SUBMITTALS

- A. Submittals: Provide submittals per Section 01 33 00, "Submittal Procedures".
- B. Product Data: Provide data on material, finishes and attachment.
- C. Manufacturer's Installation Instructions: Submit criteria for preparation and application.
- D. Samples: Accompanying materials list, submit three samples of each stair nosing.
- E. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- F. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- B. Fabricator: Fabricate light gauge structural framing members in accordance with AISI-North American Specification for the Design of Cold Formed Steel Structural Members.
- C. Installing Contractor Qualifications
 - 1. Installing Contractor: Company specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope, installed within one year prior to beginning work of this section.
 - 2. Welders shall be certified for welding with light gauge metals in compliance with all applicable AWS and CBC requirements.
 - 3. Installing Foreman: Individual specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope.

4. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.
- D. Welders' Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00, "Substitution Procedures"

2.2 MATERIALS

- A. Plates and Bars: ASTM A283 / A283M, Grade D or approved equal.
- B. Fabricated Railing Pickets: Steel, shape as shown on drawings, solid stock, per ASTM A322, finished in accordance with ASTM A108 or approved equal.
- C. Pipe: ASTM A53 / A53M, Grade B Schedule 40, (pressure test not required), unless noted otherwise.
- D. Tube: ASTM A500 / A500M, Grade B.
- E. Sheet Steel: ASTM A653 / A653M, gauge and profile indicated, galvanized to G90 finish in accordance with ASTM A653 / A653M. Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Concrete Fill: Portland Cement Concrete per Section 03 30 00, "Cast-In-Place Concrete"
- H. Shop and Touch-Up Primer: VOC approved primer.
- I. Touch-Up Primer for Galvanized Surfaces: Zinc rich Type.

2.3 STRUCTURAL SHAPES

- A. Provide structural shapes in accordance with Section 05 12 00, "Structural Steel"

2.4 STEEL PAN STAIR ASSEMBLY

A. General

1. Comply with fabrication requirements specified below.

B. Material Characteristics

1. Treads and risers: Hot rolled steel, 14 gauge, per ASTM A1011 / A1011M .
2. Landing Plates: Hot rolled steel, 12 gauge minimum, per ASTM A1011 / A1011M .
3. Stair Stringer: Steel channel, ASTM A 36, size as required for span and load.
4. Flight Header/Landing Channel: Steel channel, ASTM A 36, size as required for span and load.

C. Construction

1. Treads and risers: Concrete filled treads, 2 inch minimum depth.
2. Landing Plates: Concrete filled treads, 2 inch minimum depth.

D. Accessories:

1. Stair Nosing Embed: Wooster Products, Inc. www.wooster-products.com . Address: 1000 Spruce Street, Wooster, Ohio 44691. Phone: (800) 321-4936.
 - a. Model WP-24A, Spectra extruded aluminum insert, or equal, color SY-1 yellow, at each stair tread and landing edge.
Product Website Link: <http://www.woosterproducts.com/products/extruded-aluminum/spectra/>
2. Substitutions: Provide per Section 01 25 00, "Substitution Procedures"

E. Finish: VOC Compliant primer.

2.5 STEEL RAILING SYSTEM – TYPE 1

A. Steel Pipe: ASTM A53 / A53M, Grade B.

B. Rails and Posts: Size, shape and spacing as shown on the Drawings, welded joints.

1. Handrail: 1 inch NPS (1.33 inch OD), Schedule 80, welded joints.

C. Fittings: Elbows, T-shapes, wall brackets; bent or mitered tube steel.

D. Metal Pipe Support Mounting: Provide solid steel rod, bent as shown on drawings. Fabricate as required to provide 1-1/2 inch clear dimension from face of wall surface to railing inside surface.

1. Mounting: Adjustable brackets and flanges for mounting as detailed at stair assemblies. Modify bracket as required to provide 1-1/2 inch clear dimension from face of wall surface to railing inside surface.

E. Splice Connectors: Steel welding inserts.

F. Grout: Non-shrink, non-metallic as specified in Section 03 62 13, "Non-Metallic Non-Shrink Grouting".

2.6 FABRICATION

A. Fit and shop assemble in each item in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

G. Fabricate radiused components by cold-rolled process, using equipment and techniques resulting in crimp free surfaces. Verify component wall thickness is suitable for rolling without flattening or crimping.

H. In addition to above criteria, fabricate stair assembly, including railing components for exposed architectural appearance conditions.

1. Remove all weld splatter, grind and sand all weld joints uniformly smooth, without visible scratches, gouges, or patch marks. Conform to Finish #2 of National Ornamental and Miscellaneous Metals Association "Joint Finish Guidelines."

2. All visible welds shall be continuous; bead or spot welding not acceptable.

3. Provide tube closures at all tube and pipe components.

4. Grind edges of all bent and fabricated components smooth to a 1/4 inch radius.

2.7 FINISHES

A. Galvanize all exterior components, after fabrication, in accordance with ASTM A123 / A123M. Provide minimum 2.00 oz/sq ft galvanized coating. Fill vent holes after galvanizing.

1. Where steel is designated as painted in finished project, do not water quench or apply chromate conversion coatings as a part of the galvanizing process. Contractor shall notify steel galvanizing fabricator of all steel designated as painted.
- A. Prime paint interior items with one coat rust inhibitive VOC approved primer compatible with finish specified in Section 09 91 00, "Painting - Interior and Exterior" Prepare surfaces to be primed in accordance with SSPC SP 2.
2. Do not prime surfaces in direct contact with concrete or where field welding is required.

2.8 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection
 1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 3. In the event of discrepancy, immediately notify the Architect.
 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1.

- D. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
 - 1. Use primer as specified in above for interior steel fabrications.
 - 2. Use Galvalloy galvanizing coating in accordance with manufacturer's instructions for exterior steel fabrications.
- E. Install all railing and guardrail in accordance with applicable codes and regulations. Maintain all required clearances and dimensions, including the following:
 - 1. Maintain continuous 1-1/2 inch clear dimension between handrail and adjacent wall.
 - 2. Maintain railing, guardrail, and adjacent surface configuration so that a sphere 4 inches in diameter cannot pass through any opening or gap created.
 - 3. Do not permit railing fabrication and installation to extend into required exit dimension at stairway.
- F. Concrete Fill:
 - 1. Place concrete fill in accordance with 03 30 00, "Cast-In-Place Concrete"
 - 2. Provide swirl finish at tread and landings.
 - 3. Install stair tread insert in accordance with manufacturers recommendations. Extend full width of stair and landing, minus 1 inch at each end.

3.4 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 05 51 33
ALUMINUM LADDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Aluminum parapet access ladders.
- B. Aluminum roof hatch ladders
- C. Aluminum elevator pit ladders

1.2 RELATED SECTIONS Section 05 50 00: Metal Fabrications – Steel Fabricated Ladders & Fasteners, and Installation Requirements To Attach Aluminum Ladders To Structure.

- B. Section 05 40 00 - Cold-Formed Metal Framing
- C. Section 06 10 00: Rough Carpentry
- D. Section 07 13 26 - Self-Adhering Sheet Waterproofing
- E. Section 07 21 00 - Thermal and Acoustical Insulation
- F. Section 07 22 00 - Roof and Deck Insulation
- G. Section 07 25 00 - Weather Barriers
- H. Section 07 54 XX – XX
- I. Section 07 92 00 – Joint Protection
- J. Section 09 21 16 - Gypsum Board
- K. Section 14 24 23 - Hydraulic Passenger Elevators
- L. Section 26 05 00: Basic Electrical Materials and Methods: For electrical grounding of ladders.

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. AA – Aluminum Association.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- B. OSHA Standards For Stairs & Ladders:
 - 1. OSHA 1910.23 –Ladders.
Website Link: <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.23>
 - 2. OSHA 1910.1053 – Stairway and Ladders.
Website Link: <https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1053>
 - 3. OSHA 3124 – Stairway and Ladders. A Guide to OSHA Rules
Website Link: <https://www.osha.gov/Publications/osh3124.pdf>

- C. CCR, Title 24, 2018 ICC, With State of California Amendments – 2019 California Building Code (CBC), Part 2, Vols. 1 and 2.

1.4 REGULATORY REQUIREMENTS

- A. Ladder rungs, cleats, steps, and rails for metal ladders shall conform to the requirements of OSHA Standards 1926.1053(a)(2)-(10) & (12)-(15).
- B. Through fixed ladders at their point of access/egress shall have a step-across distance of not less than 7 inches (18 cm) nor more than 12 inches (30 cm) as measured from the centerline of the steps or rungs to the nearest edge of the landing area. If the normal step-across distance exceeds 12 inches (30 cm), a landing platform shall be provided to reduce the distance to the specified limit per the requirements of OSHA Standard 1926.1503(a)(16).
- C. Fixed ladders without cages or wells shall have a clear width to the nearest permanent object of at least 15 inches (38 cm) on each side of the centerline of the ladder per the requirements of OSHA Standard 1926.1503(a)(17).
- D. Fixed ladders shall be provided with cages, wells, ladder safety devices, or self-retracting lifelines where the length of climb is less than 24 feet (7.3 m) but the top of the ladder is at a distance greater than 24 feet (7.3 m) above lower levels per the requirements of OSHA Standard 1926.1503(a)(18)-(20).
- E. Wells for fixed ladders shall conform to the requirements of OSHA Standard 1926.1053(a)(21).
- F. Ladder safety devices, and related support systems, for fixed ladders shall conform to the requirements of OSHA Standard 1926.1053(a)(22).
- G. The mounting of ladder safety devices for fixed ladders shall conform to the requirements of OSHA Standard 1926.1053(a)(23).
- H. The side rails of through or side-step fixed ladders shall extend 42 inches (1.1 m) above the top of the access level or landing platform served by the ladder. For a parapet ladder, the access level shall be the roof if the parapet is cut to permit passage through the parapet; if the parapet is continuous, the access level shall be the top of the parapet per the requirements of OSHA Standard 1926.1053(a)(24).
- I. For through-fixed-ladder extensions, the steps or rungs shall be omitted from the extension and the extension of the side rails shall be flared to provide not less than 24 inches (61 cm) nor more than 30 inches (76 cm) clearance between side rails. Where ladder safety devices are provided, the maximum clearance between side rails of the extensions shall not exceed 36 inches (91 cm) per the requirements of OSHA Standard 1926.1053(a)(25).

1.5 SUBMITTALS

- A. Submittals: Provide submittals per Section 01 33 00, “Submittal Procedures”.
- A. Product Data: Manufacturer's data sheets on each product.
- B. Shop Drawings:
 - 1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrications and their connections.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. Provide reaction loads for each hanger and bracket.

4. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.
 2. Record of successful in-service performance.
 3. Sufficient production capacity to produce required units.
- B. Product Qualification: Product design shall comply with OSHA 1910.23. AND OSHA 1910.1053.
- C. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 1. Install ladder in area designated by Architect.
 2. Do not proceed with remaining work until workmanship and installation are approved by Architect.
 3. Rework mock-up as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurement before fabrication.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

1.9 WARRANTY

- A. Manufacturer has responsibility for an extended Corrective Period for work of this Section for a period of 5 years commencing on the shipment date of the product against all the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly and without inconvenience and cost to Owner correct said deficiencies.
 1. Defects in materials and workmanship.
 2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third-party testing laboratory. Ordinary wear and tear, unusual abuse or neglect excepted.
 3. Within the warranty period, the manufacturer shall, at its option, repair, replace, or refund the purchase price of defective ladder.

- B. Manufacturer shall be notified immediately of defective products and be given a reasonable opportunity to inspect the goods prior to return.

1.10 EXTRA MATERIALS

- A. Furnish touchup kit for each type and color of paint finish provided.

PART 2 - PRODUCTS

2.1 ALUMINUM LADDER MANUFACTURERS – 24 FT. OR LESS IN HEIGHT

- A. Manufacturer – Basis of Design: O’Keeffe’s, Inc.;

Address: 100 N Hill Drive, Suite 12, Brisbane, CA 94005.

Phone: (888) 653-3333 & (415) 824-4900

Website: <http://www.okeeffes.com>, or equal.

- 1. Fixed Access Ladder:

- a. Model 503A, Tubular Rail Low Parapet Access Ladder With Roofover Rail Extensions and Built-In Platform, with brackets, as required for proper installation.

Product Website Link – Product Info.: <https://okeeffes.com/products/503a-access-ladder/>

Product Website Link – Cut Sheet: <https://okeeffes.com/wp-content/uploads/2015/09/503A.pdf>

- a. Model 503, Tubular Rail High Parapet Access Ladder with Platform and Return, with brackets, as required for proper installation.

Product Website Link – Product Info.: <https://okeeffes.com/products/503-access-ladder/>

Product Website Link – Cut Sheet: <https://okeeffes.com/wp-content/uploads/2015/09/503.pdf>

- a. Model 501, Heavy Duty Tubular Rail Fixed Access Ladder, with brackets, as required for proper installation.

Product Website Link – Product Info.: <https://okeeffes.com/products/501-access-ladder/>

Product Website Link – Cut Sheet: <https://okeeffes.com/wp-content/uploads/2019/05/LAD501.pdf>

- A. Substitutions: Provide per Section 01 25 13, “Substitution Procedures”

2.2 ACCESSORIES

A. Landing Platform:

Product Website Link: <https://okeeffes.com/wp-content/uploads/2015/09/landing-platform-al.pdf>

B. Security Door/Security Panel:

Product Website Link: <https://okeeffes.com/wp-content/uploads/2015/09/Security-Door.pdf>

C. Rail and Harness Fall Arrest System (CAN BE USED IN LIEU OF CAGES FOR LADDERS)

Product Website Link: <https://okeeffes.com/wp-content/uploads/2015/09/Rail-and-Harness-Fall-Arrest-System.pdf>

D. Safety Post: Basis of Design:

Product Website Link: <https://okeeffes.com/wp-content/uploads/2015/09/Safety-Post.pdf>

2.3 FINISHES

- A. Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural Class I, clear coating 0.018 mm or thicker.

2.4 MATERIALS

- A. Aluminum Sheets: Alloy 5005-H34 to comply with ASTM B209.
- A. Aluminum Extrusions: Non-spark, high strength 6061-T6 alloy rungs and 6063-T5 alloy extrusions to comply with ASTM B221

2.5 FABRICATION

- A. Rungs: Not less than 1-1/4 inches (32 mm) in section and 18-3/8 inches (467mm) long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.
 - 1. Rungs shall withstand a 1,500 pound (454 kg) load without deformation or failure.
- B. Channel Side Rails: Not less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide.
- C. Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.
- D. Walk-Through Rail and Roof Rail Extension: Not less than 3 feet 6 inches (1067 mm) above the landing and shall be fitted with deeply serrated, square, tubular grab rails.

- E. Landing Platform: 1-1/2 inches (38 mm) or greater diameter, tubular aluminum guardrails and decks of serrated aluminum treads.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Obtain Architect's approval prior to site cutting or making adjustments not scheduled.
- B. Make provision for erection loads with temporary bracing. Keep work in alignment.
- A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.
- B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.
- C. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 05 55 16
METAL STAIR NOSINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish all labor, material, and equipment required for the installation of stair nosings.

1.2 SUBMITTALS

- A. Submittals: Provide submittals per Section 01 33 00, "Submittal Procedures".
- B. Manufacturer's detailed installation sheets.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Wooster Products, Inc. www.wooster-products.com, or equal
Address: 1000 Spruce Street, Wooster, Ohio 44691.
Phone: (800) 321-4936.
- B. Nystrom <https://www.nystrom.com>, or equal
Address: 9300 73rd Avenue North, Minneapolis, MN 55428
Phone: (800) 547-2635
- C. Babcock Davis <https://www.babcockdavis.com/>, or equal
Address: 9300 73rd Avenue North, Brooklyn Park, MN 55428
Phone: (888) 412-3726
- D. Substitutions: Provide per Section 01 25 00, "Substitution Procedures".

2.2 MATERIALS – NEW CONCRETE STAIR NOSINGS

- 1. Aluminum Stair Nosing Embed – Type 1:

- a. Wooster Model 231BF, “Supergrip”, 3” wide extruded ribbed abrasive aluminum insert, or equal.

Product Website Link – Product Information:

<http://www.woosterproducts.com/products/extruded-aluminum/supergrip/>

Product Website Link – Cut Sheet: <http://www.woosterproducts.com/spec/231BF.pdf>

- 1) Nosing Locations:
 - a) At top and bottom treads at all interior stairs indicated in drawings.
 - b) At each stair tread and landing edge at all exterior stairs indicated in drawings.

2. Aluminum Stair Nosing Embed – Type 2: Babcock Davis Model BSTRB-3CE, 3” wide extruded ribbed abrasive aluminum insert, or equal, single stage abrasive bars, at each stair tread and landing edge.

Product Website Link – Product Information: <https://www.babcockdavis.com/products/stair-nosings/ribbed-abrasive>

Product Website Link – Cut Sheet: <http://downloads.babcockdavis.com/babcock-davis-bstsb-c3e-stair-treads-nosings-shop-drawing.pdf>

- 2) Finish/Color: “Safety Yellow” Nosing Locations:
 - c) At top and bottom treads at all interior stairs indicated in drawings.
 - d) At each stair tread and landing edge at all exterior stairs indicated in drawings.

3. Aluminum Stair Nosing Embed – Type 3:

- a. Nystrom Model WP-3C, 3” cast aluminum insert, with silicone carbide abrasive, cross-hatch pattern, or equal, at each stair tread and landing edge.

Product Website Link: <http://downloads.nystrom.com/nystrom-stca-c3w-stair-treads-nosings-shop-drawing.pdf>

- 1) Finish/Color: “Sand Cast”/Clear Anodized.
- 2) Nosing Locations:
 - a) At each stair tread and landing edge at all exterior stairs indicated in drawings.

4. Aluminum Stair Nosing Embed – Type 4:

- a. Wooster Model M231BF-NG, “Supergrip”, 3” wide extruded ribbed abrasive aluminum insert, with “NightGlow” insert, or equal.

Product Website Link – Product Information:

<http://www.woosterproducts.com/products/extruded-aluminum/supergrit/>

Product Website Link – Cut Sheet: <http://www.woosterproducts.com/spec/m231bf-ng.pdf>

- 1) Finish: Abrasive Ribs -“Safety Yellow” rib inserts with 1” “NightGlow” nosing insert.
 - 2) Nosing Locations:
 - a) At top and bottom treads at all interior stairs indicated in drawings.
 - b) At each stair tread and landing edge at all exterior stairs indicated in drawings.
5. Aluminum Stair Nosing Embed – Type 5:
- a. Babcock Davis Model BSTSM-P3E” wide extruded ribbed abrasive aluminum insert, with “Lume-A-Lite” nosing insert, or equal.

Product Website Link – Product Information: <https://www.babcockdavis.com/products/stair-nosings/ribbed-abrasive>

Product Website Link – Cut Sheet: <http://downloads.babcockdavis.com/babcock-davis-bstsb-c3e-stair-treads-nosings-shop-drawing.pdf>

- 2) Finish/Color: “Safety Yellow” rib inserts, with “Lume-A-Lite nosing insert.Nosing Locations:
 - a) At top and bottom treads at all interior stairs indicated in drawings.
 - b) At each stair tread and landing edge at all exterior stairs indicated in drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's recommendations. Verify number and lengths required. Install firmly in place, ensuring that nosing is securely seated.

END OF SECTION

SECTION 06 16 43
EXTERIOR GYPSUM SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Fiberglass-mat faced, moisture and mold resistant exterior gypsum sheathing.
- B. Related Sections:
 - 1. Section 05 40 00 - Cold-Formed Metal Framing
 - 2. Section 06 10 00 - Rough Carpentry
 - 3. Section 07 13 26 – Self-Adhering Sheet Waterproofing
 - 4. Section 07 21 00 - Thermal and Acoustical Insulation
 - 5. Section 07 25 00 – Weather Barriers
 - 6. Section 07 92 00 - Joint Protection
 - 7. Section 09 21 16 - Gypsum Board.
 - 8. Work may be required to be coordinated with other sections

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C473 - Standard Test Methods for Physical Testing of Gypsum Panel Products.
 - 2. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 3. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - 4. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - 5. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing.
 - 6. ASTM C1396 - Standard Specification for Gypsum Board
 - 7. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 - 8. ASTM D6329 - Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers.
 - 9. ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
 - 10. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

11. ASTM E84 -Standard Test Method for Surface Burning Characteristics of Building Materials
12. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
13. Gypsum Association (GA): GA-253 Application of Gypsum Sheathing.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's specifications and installation instructions for each product specified per Section 01 33 00, "Submittal Procedures".

1.4 WARRANTY

- A. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay) commencing with the date of installation of the product in such structure.
- B. Manufacturer's Warranty:
 1. Five years against manufacturing defects from the date of purchase of the product for installation

PART 2 - PRODUCTS

2.1 MANUFACTURERS – NON-RATED GYPSUM BOARD

- A. DensGlass Sheathing, Georgia-Pacific Gypsum LLC.
- B. 1/2" ToughRock® Gypsum Sheathing
- C. Website Link: <http://buildgp.com/product/1-2-toughrock-5-8-fireguard-x-gypsum-sheathing/>
- D. Substitutions: Provide per Section 01 25 00, "Substitution Procedures"
- E. Material Properties:
 1. Thickness - nominal inches: 1/2" ± 1/32"
 2. Width - nominal: 4' (1220 mm), – 1/8"
 3. Length - standard: 8' (2440 mm) ± 1/4"
 4. Weight - 1.7 lbs/sq. ft. nominal
 5. R Value - 0.45
 6. Humidified Deflection - 10/8"

2.2 ACCESSORIES

- A. Screws: ASTM C1002, corrosion resistant treated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:

1. Inspection: Verify that project conditions and substrates are acceptable, to the installer, to begin installation of work of this section.

3.2 INSTALLATION

- A. General: Install in accordance with GA-253, ASTM C1280 and the manufacturer's recommendations.
- B. Exterior Gypsum Sheathing Installation:
 1. Install gypsum sheathing in accordance with manufacturer's recommendations. Install boards with correct side to exterior.
 2. Install board with joints over supports. Space ends and edges 1/8 inch apart.
 3. Install board using approved fasteners at maximum 8 inches on center at each support.
 4. Apply approved sealant at sheathing edges and penetrations. Coordinate all joint treatments with specified air and or water barrier.
 5. Entire face of gypsum sheathing shall be covered with weather barrier.

3.3 PROTECTION

- A. Protect gypsum board installations from damage and deterioration until date of Substantial Completion.

END OF SECTION

SECTION 06 20 23
INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Interior Millwork, Standing and Running Trim.
- B. Interior Wall Paneling.
- C. Standard and ADA Accessible Locker Room Benches
- D. Mobile Platform Stair.

1.2 RELATED SECTIONS:

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 05 40 00 - Cold-Formed Metal Framing
- C. Section 06 10 00 - Rough Carpentry
- D. Section 07 92 00 – Joint Protection
- E. Section 09 21 16 - Gypsum Board
- F. Section 09 28 13 - Cementitious Backer Boards
- G. Work may be required to be coordinated with other sections

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- B. American Plywood Association (APA), Engineered Wood Construction Guide.
- C. Woodwork Institute (WI), North American Architectural Woodwork Standards (NAAWS) 3.1, 2017 Edition with 2020 errata.
- D. Western Lumber Grading Rules, Western Wood Products Association (WWPA).
- E. Industry Standard For Interior Architectural Wood Flush Doors, Window and Door Manufacturers Association (WDMA).

- F. Redwood Inspection Service (CRA-RIS) Standard Specifications for Grades of California Redwood Lumber.

1.4 SUBMITTALS

- A. Submittals: Provide submittals per Section 01 33 00, "Submittal Procedures".
- B. Submit shop drawings indicating details, erection data associated with the work of other trades; location; materials, species of wood; quality grade; type of finish; profiles, dimensions; fastenings and clearances. Detail drawings shall be three inches equals one foot (3" = 1') or larger finishes, and accessories.
- C. Samples
 - 1. Submit four samples 4 x 6 inch in size illustrating wood grain and specified finish for each type of millwork.
 - 2. Samples: Submit samples of all interior and exterior trim materials. Samples shall be finished as specified and submitted for color and material approval prior to delivery and installation.
- D. The mill shall take and be responsible for all field measurements required for the proper fabrication and installation of the work. Show all field dimensions beyond control of mill.
- E. Report any major discrepancy between the Drawings and the field dimensions to the Architect before fabrication of the work.
- F. Coordinate dimensions and installation requirements of Owner furnished equipment.
- G. Certification:
 - 1. Submit WI Certified Compliance certification covering all work of this Section prior to delivery of any materials to the job site.
 - 2. Grade mark and mill identification of the association having jurisdiction shall appear distinctly legible on the back of each piece of lumber and plywood. No marks shall appear on exposed faces of work to receive transparent or semi-transparent finishes.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with North American Architectural Woodwork Standards (NAAWS) and as required by this Section.
- B. Installer's Qualifications: Use only journeymen finish carpenters who are thoroughly trained and experienced in the skills required for the cutting and fitting of trim and finish materials.
- C. Installation Acceptance: All rejected work shall be removed and replaced with no additional cost to the Owner.
- D. The mill shall take and be responsible for all field measurements required for the proper fabrication and installation of the work. Show all field dimensions beyond control of mill.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver products to site under provisions of Section 01 60 00, "Product Requirements"
 - 2. Do not deliver material to site until required temperature and relative humidity conditions have been stabilized and will be maintained in installation areas.
- B. Storage, Handling and Protection:
 - 1. Store and protect products under provisions of Section 01 60 00, "Product Requirements"
 - 2. Provide all work or materials necessary to store, cover and protect all materials specified to be furnished and installed under this Section. Store all materials under cover in a well-ventilated enclosure and protect against extreme changes in temperature and humidity. Avoid any marring and keep the materials clean during handling and installation operations. Protect exposed finish work and materials after their erection from damage of any character. Work damaged through neglect or failure to provide protection shall be repaired or replaced by the Contractor without additional cost to the Owner.
- C. Store materials in ventilated, interior locations under constant minimum temperatures of 60 degrees F and maximum relative humidity of 55 percent.
- D. Deliver work in this section only at such time as the work is ready and suitable for installation.
- E. Comply with requirements of NAAWS Section 2, Care and Storage.

PART 2 - PRODUCTS

2.1 INTERIOR MILLWORK

- A. All Material Grades and Construction shall be WI custom grade, including all supplements, unless specified or indicated otherwise. Semi-exposed and other components shall be as permitted by WI standards for construction quality specified herein except as otherwise detailed or specified. Moisture content shall be in accordance with WI Standards for millwork.
- B. Standing and running trim, panel frames, and miscellaneous millwork.
 - 1. Species: White Birch, WDMA Grade 1 (Premium) Grade
 - 2. Grade: Transparent Finish, per WIC section 5.
 - 3. Surface: S4S
 - 4. Moisture Content: Certified Kiln Dry.
 - 5. Finish: Transparent per Section 09 91 00, "Painting - Interior and Exterior" Standing and running trim, panel frames, and miscellaneous millwork.
- 1. Species: Douglas Fir.
- 2. Grade: Superior Finish per WWPA
- 3. Surface: S4S

4. Moisture Content: Certified Kiln Dry.
 5. Finish: Transparent per Section 09 91 00, "Painting - Interior and Exterior" Standing and running trim, panel frames, and miscellaneous millwork.
 1. Species: American Black Cherry
 2. Grade: Premium, per AWS, Section 3.
 3. Surface: S4S
 4. Wide Face Appearance: Flat sliced.
 5. Moisture Content: Maximum 12%, minimum 6%.
 6. Finish: Transparent, finished per Section 09 91 00, "Painting - Interior and Exterior"
- E. Standing and running trim, panel frames, and miscellaneous millwork. Paint grade.
1. Species: Poplar.
 2. Grade: Premium, per AWS, Section 3.
 3. Moisture Content: Maximum 12 percent, minimum 6 percent.
 4. Finish: Transparent per Section 09 91 00, "Painting - Interior and Exterior" INTERIOR WALL PANELING
- A. Interior Wood Wall Paneling – Non-Rated Water Resistant (Painted):
1. Species: Douglas Fir.
 2. Grade: APA 303 Rated, Medium Density Overlay (MDO) Engineered Plywood, Exterior.
 3. Surface: MDO – Smooth opaque resin overlay.
 4. Thickness: 5/8 inch
 5. Pattern: Plain Face Pattern, with milled ship lap edge at all joint conditions.
- B. Interior Wood Wall Paneling – Non-Rated Plywood (Painted or Stained):
1. Species: Douglas Fir.
 2. Grade: APA 303 Rated Plywood, A-C Exterior.
 3. Surface: Douglas Fir Veneer.
 4. Thickness: 3/4 inch
 5. Pattern: Plain Face Pattern, with milled shiplap edge at all joint conditions.

C. Interior Wood Wall Paneling – Fire Retardant Treated Plywood (Painted or Stained):

1. All plywood shall be pressure treated in accordance with AWWPA standard U1 with an approved high temperature interior Type A-HT fire retardant. Each panel shall be labeled or marked by an approved independent testing agency. After treatment, plywood shall be dried to an average moisture content of 15 percent or less. Plywood shall be all-veneer APA rated sheathing.
2. Species: Douglas Fir.
3. Grade: APA Rated Plywood, A-C Exterior.
4. Surface: Douglas Fir Veneer.
5. Thickness: 3/4 inch
6. Pattern: Plain Face Pattern, with milled shiplap edge at all joint conditions.

D. Interior Wood Wall Paneling – Fire Retardant Treated Particle Board (Painted):

1. Manufacturer: Arauco North America,
Address: 400 Perimeter Center Terrace, Suite 750, Atlanta, GA
Website: <https://www.arauco.cl/na/>. Phone: 800-261-4890 or Equal
2. Type: Prefinished, Fire Rated Particle Board
3. Series: DuraFlake FR.
Product Website Link: <https://na.arauco.com/en/p/duraflake-fire-rated-duraflake-firerated>
4. Characteristics:
 - a. Thickness: 1/2 inch
 - b. Edge Treatment: Ship Lap at vertical edge.
 - c. Backing: AWS Approved backing sheet.
5. Fire/life Safety Criteria:
 - a. Listing: UL Listing, as required for a Class A/Class I product.
6. Color and Finish
 - a. Finish: DuraCoat, prefinished acrylic coating.

2.3 FASTENERS, FILLERS AND ADHESIVES:

- A. Nails: Interior: Finish nail, bright finish, length as required to suit application.

- C. Bolts, Nuts, Washers, Blind Fasteners, Lags, and Screws: Size and type to suit application; finish as for nails.
- B. Provide fasteners of size and type to suit application and complying with AWS Architectural Woodwork Standards.
- D. Wood Filler: Tinted to match surface finish color.
- E. Adhesives:
 - 1. For Interior Work: CS 35-61 Type II (water-resistant). Shall withstand cold-soak tests specified in PS 51-71.

2.4 LUMBER

- A. Sleepers and toe kicks: Douglas fir, pressure treated when in direct contact with concrete slab-on-grade.
- B. Uses not otherwise specified: Hardwood or softwood; grade in accordance with AWS Section 2 and 3 as required for use.

2.5 FABRICATION

- A. Mill components to profiles as specified and as shown on architectural drawings.
- B. Fabricate all components to WI Custom quality and standards, unless noted otherwise.

2.6 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

2.7 HARDWOOD SHOWER BENCHES - STANDARD

- A. Manufacturer: Global Industrial, www.globalindustrial.com, or equal.

Address: 11 Harbor Park Drive, Port Washington, NY 11050.

Phone: (800) 645-1232 or (888) 987-7759

- 1. Type: Maple Locker Bench With Steel Pedestals

Product Website Link:

<https://www.globalindustrial.com/p/storage/lockers/benches/maple-hardwood-locker-bench-8-bolt-down-1>

- 2. Characteristics:

- a. Bench Material: Maple

- b. Bench Size: 9-1/2 wide inch plank x 96 in long x 1-1/4 inch thick

- c. Support frame: 17 inch high gray painted steel pedestals by manufacturer.
- d. Finish: Clear heavy varnish, manufacturer supplied.

2.8 HARDWOOD SHOWER BENCHES – ADA ACCESSIBLE

- B. Manufacturer: Wisconsin Bench Mfg, as available through Global Industrial, www.globalindustrial.com, or equal.

Address: 11 Harbor Park Drive, Port Washington, NY 11050.

Phone: (800) 645-1232 or (888) 987-7759

- 1. Type: Model No. LBSADA20x48, Maple ADA Accessible Locker Bench With Steel Pedestals
 - a. Product Website Link: <https://www.globalindustrial.com/p/storage/lockers/benches/ada-locker-room-bench-with-seat-back-and-pedestal-48-l-x-20-w-x-17-1-4-h-269860>
- 2. Characteristics:
 - a. Bench Material: Maple
 - b. Bench Size: 48 wide inch x 20 inch deep x 18" high back x 1 ¼" thick
 - c. Support frame: 17 inch high gray painted steel pedestals by manufacturer.
 - d. Finish: Clear heavy varnish, manufacturer supplied.

2.9 HDPE SHOWER BENCH – STANDARD BENCH

- C. Manufacturer: Scranton Products, www.scrantonproducts.com, or equal.

Address: 801 East Corey Street, Scranton, PA 18505. Phone: (800) 445-5148.

- 1. Type: Tufftec Benches - Solid plastic bench planks with steel supports as shown on drawings.
Product Website Link: <https://www.scrantonproducts.com/products/tufftec-benches/>
- 2. Characteristics:
 - a. Bench Material: HDPE plastic
 - b. Bench Size: 1-1/4 inch x 9-1/2 inch plank.
 - c. Support frame: 16 inch high black aluminum supports by manufacturer.
 - d. Color: As selected from manufacturer's standard color selections.

2.10 STAIR PLATFORM ACCESSORIES

2. Caster: McMaster-Carr No. 9908T14/9908T13, 3 inch diameter, 2 inch wide, phenolic wheel tread, 700 pound capacity. Provide caster with brake at locations shown on drawings.

Product Website Link: <https://www.mcmaster.com/catalog/126/1503>

3. Magnetic Touch Latch: Hafele 246.92.002 Magnetic Catch with 15lb. holding power or equal, 1 per access panel.

Product Website Link: <https://www.hafele.com/us/en/product/magnetic-catch-holding-power-15-lbs/0000013e0003080100010023/>

4. Hinge: Brass, 0.040 gage, leaf width as required, full length of access panel.
5. Cane Bolt: Provide 1/2 inch diameter anchor bolt, with 2 inch return, and length as required to embed 1 inch in metal strike sleeve.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection

1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

- A. Before installation, apply approved sealer to all unexposed surfaces per Section 09900.
- B. Before installation, seal all edges of paneling with approved sealer per Section 09900.

3.3 INSTALLATION

- A. Install work in accordance with AWS Section 6 Premium quality standards and as specified.
- B. Set and secure materials and components in place, plumb and level.
- C. Install components and trim with fasteners as shown or required.
- D. Interior millwork

1. Install millwork with mitered corners. Vertically scarf all intermediate joints.
2. Set fasteners for filler with proper size tool. Do not damage surface. Use of staples or T-nails not permitted.
3. Install shower bench as shown on drawings. END OF SECTION

SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Custom fabricated cabinet units.
- B. Cabinet hardware.
- C. Preparation for installing utilities.
- D. Repair of existing casework.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 05 40 00 - Cold-Formed Metal Framing
- C. Section 06 20 23 - Finish Carpentry.
- D. Section 06 61 16 - Solid Surfacing Fabrications
- E. Section 09 68 13 - Tile Carpeting
- F. Section 09 70 00 - Vinyl -Coated Fabric Wall Coverings
- G. Section 09 91 00 - Painting - Interior and Exterior
- H. Division 26 - For new and existing electrical work installed in casework.
- I. Work may be required to be coordinated with other sections

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. ANSI/BHMA A156.9 – American National Standards For Cabinet Hardware
- B. ANSI A208.1 - Particleboard
- C. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications
- D. ANSI A135.4 - Basic Hardboard
- E. ANSI A135.5 - Prefinished Hardboard Paneling
- F. ANSI A135.7 - Engineered Wood Trim
- G. ANSI-HPVA HP-1-2016 American National Standard for Hardwood and Decorative Plywood
- H. ASTM A153 / A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- I. ASTM D5582 - Standard Test Method for Determining Formaldehyde Levels from Wood Products Using a Desiccator
- J. ASTM D6007 - Standard Test Method for Determining Formaldehyde Concentrations in Air from Wood Products Using a Small-Scale Chamber

- K. ASTM E1333 - Standard Test Method for Determining Formaldehyde Concentration in Air and Emission Rates from Wood Products Using a Large Chamber
- L. Composite Panel Association (CPA)'s Eco-Certified Composite (ECC) Sustainability Standard - Emission limits no higher than the California Air Resources Board (CARB) Airborne Toxic Control Measure ("CARB Rule").
- M. CPA - Standard Method for Measurement of Warp in Composite Panels
- N. CPA – Certified compliance with CARB ATCM 93120
- O. Formaldehyde Standards for Composite Wood Products Act (Title VI of the Toxic Substances Control Act (TSCA)
- P. FS MM-L-736 - Lumber, Hardware.
- Q. National Electrical Manufacturers Association (NEMA) LD.3, High Pressure Decorative Laminates.
- R. PS 20 - American Softwood Lumber Standard
- S. North American Architectural Woodwork Standards (NAAWS) 3.1, 2017 Edition with 2020 errata.

1.4 REGULATORY REQUIREMENTS

- A. Comply with seismic attachment requirements, Chapter 16A, Part 2, Title 24, CCR.

1.5 SUBMITTALS

- A. Provide submittals under provisions of Section 01 33 00, "Submittal Procedures".
- B. Shop Drawings:
 - 1. Must bear WI certificate of compliance stamp and be in accordance with Section 1 of the WI Manual of Millwork.
 - 2. Indicate materials, component profiles and elevations, assembly methods, joint details, anchorage details, accessory listings, hardware schedule, and schedule of finishes.
 - 3. The casework fabricator shall take and be responsible for all field measurements required for the proper fabrication and installation of the work. Show all field dimensions beyond control of mill.
 - 4. Report any major discrepancy between the Drawings and field dimensions to the Architect before fabrication of the work.
 - 5. Indicate conditions for all casework, identified with locations, quality grade, type of finish and species of wood.
 - 6. Show casework in related and dimensional position with sections either full size or three inches equals 1 foot (3" = 1').
 - 7. Coordinate dimensions of equipment or items indicated to be built into the casework.
 - 8. Coordinate dimensions and installation of Owner-furnished equipment.
 - 9. Indicate casework hardware proposed for use.
 - 10. Indicate new identification tag layout and numerical sequencing per information provide by Owner.

- Product and Material Data
 1. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes. Include seaming plan of all countertop materials.
 2. Provide written certification of current approval of fabrication and anchorage method where deviation from contract documents is proposed.
 3. Submit written certification of compliance with specified particleboard or fiberboard product criteria.
- Samples:
 1. Prior to fabricating, provide color chip samples for Architect's review.
 2. Prior to fabricating, provide hinge, handle and lock samples for Architects review.
 3. Samples: Submit product data sheets of drawer pulls, hinges, locks, ID tags, and other specified hardware accessories, illustrating hardware type and finish.
- B. Provide Woodwork Institute (AWS) Certified Compliance documents as specified.
 1. Provide AWS Certified Compliance label on shop drawings.
 2. Provide AWS Certified Compliance Certificate prior to delivery to job site.
 3. Provide AWS Certified Compliance Label on all casework and countertops.

1.2 QUALITY ASSURANCE

- A. Provide fabricator specializing in the fabrication of specified solid surfacing countertops, be accredited by manufacturer, with a minimum of five years documented experience, including completion of projects of similar scope within past 12 months.
 1. AWI's Quality Certification Program accredited participant.
- B. All work shall be manufactured and installed in accordance with the standard established in the latest edition of the Manual of Millwork (including any amendments) as adopted by the WOODWORK INSTITUTE (WI) in Custom Grade.
- C. Perform work in accordance with AWI Architectural Woodwork Standards (AWS), Section 10 Casework, Section 11 Countertops, and as required by this Section.
 1. Where more restrictive than referenced standards, comply with requirements of this Section.
- D. Seismic Anchorage: Provide seismic anchorage for wall and base cabinets as required by the 2016 California Code of Regulations (CCR), Title 24, Part 2.
- E. Issue a AWS Certified Compliance Certificate prior to delivery certifying that products fully meet all the requirements of the AWS Grade specified.

1.3 PRE-INSTALLATION CONFERENCE

- A. Convene one week prior to commencing installation work of this section.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver work in this Section only when the work is ready and suitable for installation.

- B. Protect units from moisture damage and deter their erection from damage of any character. Work damages through neglect or failure to provide protection shall be made good by the contractor and without additional cost to the Owner.
- C. Comply with requirements of AWS Section 2 requirements for care and storage of millwork.

1.5 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on shop drawings.
- B. Field verify existing finish floor conditions to insure specified finish countertop heights and knee space clearances at accessible stations are maintained. If shimming is required to level units, this shall be taken into account in base cabinet construction.

1.6 COORDINATION

- A. Coordinate the work with electrical rough-in, to assure orderly and efficient sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance.

2.2 PLASTIC LAMINATE COVERED CASEWORK

- A. Type: Flush Overlay, Style A Frameless
 - 1. Provide casework conforming to AWS Custom grade, modified as specified in this Section, and in accordance with approved fabrication methods.
- B. Construction:
 - 1. Casework Cores and Cabinet Door Cores:
 - a. Roseburg Medite II, or equal. Medium Density Fiberboard (MDF), per ANSI A208.2, latest edition and NEMA LD3-85. Phone - (541) 679-3311. Website Link: <https://www.roseburg.com/Product/medite-ii/>
 - b. Interiors of closed cabinets as detailed in drawings
 - c. Casework Core Visible Edges: as detailed in drawings
 - 2. Substitutions per Section 01 25 00, "Substitution Procedures".
 - 3. Cabinet Doors and Faces:
 - a. CRL-Blumcraft satin anodized 1301-cm display case double door - 3/8" laminated glass, pivot hinge
 - b. As detailed in drawings
- 1. Countertops:
 - a. Plywood Sub-top:
 - 1) At all new cabinet locations provide 1/2" or 1" thick AC structural plywood as shown

on drawings. Edge bind all exposed edges to match cabinet body. Provide longer 'leg' as shown on drawings to attach to wall ledger.

2. Shelving - Open:
 - a. For Shelves up to 36 inches in length: Provide MDF core as specified in this Section, 3/4 inch thick minimum thick plastic laminate-covered plywood at all open casework units, or thickness as required for 50 pound per square foot loading per AWS Section 10 and AWS Appendix B.
 - b. Provide 1 1/8" thick plastic laminate-covered plywood at all open casework units and at all locations where shelves exceed 36 inches in length.
3. Shelving – Concealed:
 - a. For Shelves up to 36 inches in length: Provide MDF core as specified in this Section, 3/4 inch thick minimum thick melamine-covered plywood, or thickness as required for 50 pound per square foot loading per AWS Section 10 and AWS Appendix B.
 - b. Provide 1 1/8" thick melamine-covered plywood at all locations where shelves exceed 36 inches in length .
 - c. Fixed shelves shall be dadoed into vertical.
4. Shelving – All Types:
 - a. Front edge of shelves shall have one-piece 1" or 3mm PVC edge banding.
 - b. Dividers, where used as vertical supports, shall be 3/4" MDF core melamine covered and shall have one-piece 1" or 3mm PVC edge banding.
 - c. Edge banding colors to be selected from manufacture standard color range.
 - d. All shelves shall have holes on bottom front sides to receive adjustable shelf bracket retention pins.
5. Wood Veneer Laminate: At locations indicated on the Drawings, provide natural wood veneer overlay in lieu of high pressure plastic laminate. Wood veneer shall be selected to best match existing adjacent wood veneer casework. Finish with stain and clear lacquer to best match existing.
6. Glass Glazing:
 - a. Where glass is identified in cabinet doors, glass shall be 3/8" thick tempered. Provide recessed frame reveal to receive glass for flush installation on interior of cabinet door. Secure with removable screw-type fasteners.
 - b. Provide sealant or gaskets as required to securely fasten glass for tight fit without vibration or rattling in its setting bed.
7. Fasteners: Bolts, Nuts, Washers, Lags, Pins, and Screws to be per WI standards and as shown on approved shop drawings.
8. Wood Fillers: Color to match wood being filled.
9. Casework core air quality regulation compliance: Comply with CARB ATCM Rule 93120, Phase I and Phase II emission levels limiting formaldehyde emissions from all MDF composite cores.

10. Provide Scientific Certification Systems certification that product is manufactured from 100 percent recovered and recycled wood fiber content and contains no added formaldehyde.

B. General Surface Finish Criteria:

1. Exposed portions: Finish exposed portions with metal laminate as specified in this Section. For purposes of this specification, definition of exposed portions requiring laminate includes:
 - a. Interior surfaces of knee space or recesses provided for movable equipment.
 - b. Tops of cabinets with more than 18 inches clear between ceiling and cabinet.
 - c. Bottoms of all wall hung cabinets
 - d. All exposed cabinet door surfaces, including edges.
 - e. Exposed exterior surface of all cabinet backs.
 - f. All fixed and adjustable shelving and cubbie surfaces, including all 4 edges.
2. Semi-exposed Portions - As specified in this Section.
3. Concealed Portions: As defined in AWS Section 10, or as modified in this Section.
4. Filler panels: Provide filler panels as required to accommodate door and drawer function and allow for scribing cabinet to adjoining surfaces. Unless noted otherwise, provide 2 inch dimension at wall conditions, and 4 inch dimension at inside, cabinet to cabinet corner conditions.
5. Other Materials
 - a. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.
 - b. All such work shall be of custom grade quality with finishes as shown. Where no finish is indicated, it shall be same as similar or adjacent work.

2.1 PLASTIC LAMINATE AND FINISH MATERIALS

A. Metal Laminate:

1. Manufacturer: Provide manufacturer as shown in drawings. If alternate manufacturer is proposed, Architect shall be sole judge if color and finish are acceptable.

B. High Pressure Laminated Plastic:

1. Manufacturer: Provide manufacturer as shown in drawings. If alternate manufacturer is proposed, Architect shall be sole judge if color and finish are acceptable.
2. High Pressure Laminated Plastic Series/Type: Provide grades as follows – including exposed faces at open shelving:
 - a. Provide Type VGS per NEMA LD-3, 0.032 inches, at vertical surfaces designated to receive high pressure laminated plastic.
 - b. Provide Type HGS per NEMA LD-3, 0.045 inches, at horizontal surfaces designated to receive high pressure laminated plastic, including shelving and countertops.

- c. Formed Surfaces: Post-forming type, nominal 0.042”.
- C. Low Pressure Finishes for semi-exposed surfaces:
 - 1. Unless specified otherwise, provide AWS listed low pressure thermosetting coating.
- D. Backing Sheet: AWS Listed material – 0.030” melamine, or equal, minimum.
- E. Manufacturers:
 - 1. Formica - <https://www.formica.com/en-us/products/lamhome>
Phone: (800) 367-6422
 - 2. Panolam Surface Systems, Pionite - <https://panolam.com/pionite/>
Phone: (877) 726-6526
 - 3. Panolam Surface Systems, Nevamar - <https://panolam.com/nevamar/>
Phone: (877) 726-6526
- F. Color/Finish:
 - 1. See A8.1.1 for Colors and Finishes
 - a. As selected by Architect from full color and finish line for specified product applications.
 - b. A maximum of two separate colors and finishes will be selected by Architect for each material for casework, doors, shelves and drawers.
 - c. A maximum of one color will be selected by Architect from full color and finish line for semi-exposed surfaces with low pressure finish.
- G. Substitutions: Provide per Section 01 25 00, “Substitution Procedures”.

2.2 COUNTER BRACKETS

- A. Basis of Design: As manufactured by A & M Hardware, “Concealed Workstation Brackets – C-9 through C30, as required”, or equal. Phone - (888) 647-0200, Website Link: <https://www.aandmhardware.com/concealed-brackets.php>
- 1. Construction:
 - a. 1/8” steel construction
 - b. 2” wide, flanges bent, not welded
 - c. 1,800 lbs. per pair, min.
 - d. Sizes as appropriate for depths of countertops.
 - e. Color as selected by Architect from manufacturer’s full line of options.

2.3 ACCESSORIES

- A. Adhesive: Water based type recommended by laminate manufacturer to suit application. Solvent based contact and urea resin adhesives are not permitted.
- B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; stainless steel or cadmium plated steel.

- C. Sleepers and toe kicks: Douglas fir, pressure treated when in direct contact with concrete slab-on-grade.
- D. Uses not otherwise specified: Hardwood or softwood; grade in accordance with Section 3 and 4, AWS as required for use.

2.4 HARDWARE

- A. Hardware shall be furnished and installed as required to provide for a complete casework installation. Provide all additional hardware items as needed for a complete and proper installation as recommended by WI Supplemental No. 1 for Finish Hardware.
- B. Provide in accordance with Resource Guide Appendix to AWS except as noted below.
- C. Hardware shall be 626 finish, unless specified otherwise.
- D. Manufacturers –Basis of Design, or equal:
 - 1. All Products, As Noted In Following Sections - Contact Information:
 - a. Accuride Corp. – <https://www accuride.com>
Phone: (866)-957-8806
 - b. Baldwin Hardware Manuf. Corp. - <https://www.baldwinhardware.com>.

Phone: (800) 566-1986
 - c. Best Access Systems - <https://www.bestaccess.com>
Phone: (855) 365-2407
 - d. The Engineered Products Co. (EPCO) - <https://www.epcohardware.com>
Phone: (888) 414-3726
 - e. Hafele - <https://www.hafele.com/us/en/>
Phone: (800) 423-3531 or (888) 437-7477
 - f. Knappe and Vogt. - <https://www.knappeandvogt.com>
Phone: (800) 253-1561
 - g. Stanley - www.stanleyhardwarefordoors.com
Phone: (855) 365-2407
 - h. Trimco - www.trimcohardware.com
Phone: (323) 262-4191
- E. Substitutions for all products listed this Section per Section 01 25 00, “Substitution Procedures”
- F. Manufacturers/products listed below are “or equal”.
 - 1. Display Case Door System:
 - a. CRL 1301-CM, aluminum finish.
Product Website Link: [CRL-ARCH | Specialty Casework \(crl-arch.com\)](http://CRL-ARCH | Specialty Casework (crl-arch.com))

2. Cabinet and Drawer Pulls:
 - a. Trimco No. 553, 3” center-to-center wire lop handle pull, 626 satin finish.
Product Website Link: <http://trimcohardware.com/wp-content/uploads/2014/04/553-562-CutSheet.pdf>
 - b. EPCO (The Engineered Products Co.), MC-402-3, 3” center-to-center wire lop handle pull, 626 satin finish.
Product Website Link: <https://www.epcohardware.com/Made-In-The-U.S.A/Wire-Pull-MC402-3/>
 - c. Baldwin Hardware Manuf. Corp., No. 4672, 3” center-to-center wire lop handle pull, 626 satin finish.
Website Link: <http://www.baldwinhardware.com/products/details/cabinet-hardware/pulls/wire-pull-4672-150>
3. Hinges: Provide European concealed type, minimum 160 degree minimum, opening with spring closer:
 - a. Hafele, Model 354.65.420
Product Website Link: <https://www.hafele.com/us/en/product/five-knuckle-institutional-hinge-grade-1-opening-angle-270-steel-for-3-4-door-thickness/000000b40003433900030023/>
 - b. Hafele, Model C2PFA99
Product Website Link: <https://www.hafele.com/us/en/product/concealed-hinge-hafele-duomatic-165-full-overlay-mounting/0000000f0001b7fd00010023/>
4. Drawer Guides:
 - a. Drawers - Less Than 24” - Accuride Model 4034 - Medium Duty and Over-Travel Slide with Progressive Movements
Product Website Link - <https://www accuride.com/products/drawer-slides/4034-medium-duty-over-travel-slide-with-progressive-movement>
 - 1) Load rating: 150 lbs.
 - 2) Rail mount disconnect
 - 3) Clear zinc finish
 - b. Drawers - 24” – 27” - Accuride Model 4032 - Medium Duty and Over-Travel Slide with Progressive Movements
Product Website Link - <https://www accuride.com/products/drawer-slides/4032-medium-duty-full-extension-slide-with-progressive-movement>
 - 1) Load rating: 150 lbs.
 - 2) Rail mount disconnect
 - 3) Clear zinc finish
 - c. Drawers – 27” to 42” Wide” - Accuride Model 3634 - Medium Duty Over-Travel Slide
Product Website Link - <https://www accuride.com/products/drawer-slides/4032-medium-duty-full-extension-slide-with-progressive-movement>

- 1) Side mount
 - 2) Load rating: 200 lbs.
 - 3) Clear zinc finish
- d. Bottom Drawers – up to 42” wide – Accuride Model 3640A – Heavy-Duty Over-Travel Slide With Adapter Rail Mount Disconnect
- Product Website Link - <https://www accuride.com/products/drawer-slides/3640a-heavy-duty-over-travel-slide-with-adapter-rail-mount-disconnect>
- 1) Side mount
 - 2) Load rating: 200 lbs.
 - 3) Clear zinc finish
5. Cabinet Locks:
- a. Provide (2) keys for each lock. Locks in each room shall be keyed alike. Each room shall be keyed different. Provide master key per site.
 - b. Pin and tumbler slide bolt lock, two keys each – Acceptable Manufacturers below, or equal:
 - 1) Schlage. Model No. CL2009626, Cabinet Drawer Lock with 6 Pin Standard C Cylinder from the Commercial CL-Series Lock.
Product Website Link: <https://www.build.com/schlage-cl2009pb/s455655?uid=490666>
 - 2) Best Access Systems, 5L Series Latchbolt –
Product Website Link: <https://www.bestaccess.com/products/other/l-series/>
 - 3) Olympus Lock, Inc. 500 DR, R Series, deadbolt cabinet door lock, or approved equal.
Product Website Link: 500 DR: <https://www.edlocks.com/olympus-lock-500dr-deadbolt-cabinet-door-lock/>
Product Website Link : R Series:
<https://www.olympuslock.com/Pages/Products.html?productList=family>
6. Grommets:
- a. Hardware Concepts Inc., two-piece plastic grommets to match conditions.
Product Website Link:
https://hardwareconcepts.com/2012/index.php?route=product/category&path=73_76
7. Shelf Supports:
- a. Mortise-Mount Pilaster Shelving System: Provide Knape and Vogt, KV 255 standards, with KV 256 shelf supports or equal.
Product Website
Link:<https://www.knapeandvogt.com/sites/default/files/Hardware-Guide-255-256.pdf>
 - b. Shelf Supports For Drilled Holes:

- 1) Provide Knappe and Vogt, KV 345 shelf supports for 5 mm holes.
Product Website Link: <https://www.knappeandvogt.com/345-series>
 - 2) Provide Knappe and Vogt, KV 346 shelf supports for ¼” holes.
Product Website Link: <https://www.knappeandvogt.com/346-series>
8. Magnetic catches: Provide magnetic catches at all cabinet doors, with maximum 5 pounds holding power.
- a. EPCO, 591-P, Magnetic Catch
Product Website Link: <https://www.epcohardware.com/Magnetic-Catches/Magnetic-Catch-591-P/>
 - 1) One per leaf for doors up to 48 inches high and two per leaf for doors over 48 inches.
 - 2) Catch on inside of door to be mounted directly behind door pull on outside of door.
 - 3) Anchors, Nails and Screws: Select material, type, size and finish required by each substrate for secure anchorage. Provide toothed steel or lead expansion bolt screws for drilled-in-place anchors.

2.5 REPAIRS TO EXISTING CASEWORK, WHERE APPLIES:

- A. Contractor shall review all hardware and operation condition of existing casework and notify Architect of any repair or replacement required to provide operation as if new.
- B. Where existing casework is identified for repair or components are being replaced, fabricate appropriate components to best suite replacement or repair work being performed and to best match existing construction materials, methods and finishes.

2.6 FABRICATION

- A. Construct casework conforming to AWS Custom grade, modified as specified in this Section, and in accordance with DSA approved fabrication methods.
 1. Provide white bumpers.
 2. Provide white anchor screw covers/caps.
 3. Provide corbels matching countertop material as necessary to support counter screens.
 4. Fabricate all drawers to full depth of cabinet.
 5. Provide cabinet locks at the following locations:
- B. Shop assemble casework for delivery to site. Do not glue any materials on site without prior approval.
- C. Fit shelves, doors, drawer fronts, and other exposed edges with matching materials. Use full length pieces only. Provide edging at all edges of adjustable shelves.
 1. Where laminated plastic is used with a pattern or design, such as wood grains, vertically match and align pattern across face of door and drawer fronts.
- D. Plough drawer bottoms into sides, fronts, or sub fronts, and backs. Surface attachment of bottoms is not acceptable.

- E. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from on - site dimensions. Prime paint or seal contact surfaces of cut edges.
- F. Install wire grommet as directed by Architect
- G. Install door and drawer handle horizontally, spaced as shown on drawings. Do not center drawer handles in drawer face. Space same distance from top edge of drawer as at doors.

2.7 SOLID SURFACE COUNTERTOPS TOPS, SHELVES & SPLASHES

- A. See Section 06 61 16, "Solid Surfacing Fabrications".

PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify adequacy of backing and support framing.
 - 3. In the event of discrepancy, immediately notify the Architect.
 - 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

- A. General:
 - 1. Set and secure casework in place; rigid, plumb, and level, in accordance with WI standards and DSA approved anchorage details.
 - 2. Field verify existing finish floor conditions to insure specified finish countertop heights and knee space clearances at accessible stations are maintained. If shimming is required to level units, this shall be taken into account in base cabinet construction. In no case shall specified finish countertop heights and clearances be compromised.
 - 3. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
 - 4. Provide cutouts for plumbing fixtures, apparatus sleeves, inserts, grommets, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges. Where existing countertops are being replaced with new, remove and reinstall all existing fittings unless otherwise indicated on the Drawings.
 - 5. Install rubber wall base at all exposed toe-kicks and extend inside all accessible sink base cabinets.

B. Fasteners and Anchorage:

1. All fasteners securing cabinet bodies to preservative treated wood sill plates shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A153 / A153M.
2. Use concealed joint fasteners to align and secure adjoining cabinet units counter tops and support brackets.
3. Use fixture attachments in concealed locations for wall mounted components.
4. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
5. Provide design and detailing for seismic attachment/bracing of all free - standing library shelving units, including specifying and coordinating all required embedded shields necessary to comply with DSA requirements.
6. Anchor Strips:
 - a. Install separate anchor strips behind cabinet back. Cabinet back shall not be used for anchorage.
 - b. Unless shown otherwise on drawings, provide one anchor strip top and bottom for wall hung cabinets and base cabinets less than four feet high. Provide three strips for base cabinets over four feet high.
 - c. Secure anchor strips in compliance with load resistance criteria defined in this Section.

C. Scribes and Closure Panels:

1. Scribe cabinets in accordance with AWS standards, Custom Grade, except that use of cellulose sponge is not acceptable.
2. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
3. Provide closure panels and seal all cases to walls including tops wall hung cabinets and tall cabinets.

D. Existing Casework and Countertops, Where Applies:

1. Where existing casework is identified for repair or components are being replaced, fabricate appropriate components to best suite replacement or repair work being performed. Where a cabinet unit may be removed and a free end left exposed, new end panels and filler strips shall be provided for a clean finish.
2. Where new countertops are replacing existing, remove and re-install any and all apparatus support sleeves and other accessories. Re-install all electrical outlets, gas valves, water valves and other accessories unless otherwise noted.

3.3 ADJUSTING

- A. Adjust work prior to final inspection for smooth operation.
- B. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

1. Adjust doors with mechanical and magnetic catches to limit opening force to maximum 5 pounds force.
- B. Owner reserves the right to request an inspection by WI representative for conformance to reference standards.

3.4 CLEANING

- A. Clean work prior to final inspection.
- B. Clean casework, counters, shelves, hardware, fittings and fixtures.
- C. Clean all adjacent areas affected by Casework installation.

END OF SECTION

SECTION 06 61 16
SOLID SURFACING FABRICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Solid surfacing countertops and fabrications.
- B. Laboratory solid phenolic laboratory tops, shelves, splashes and fabrications.
- C. Coordination with fixtures and components specified in other sections.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 05 40 00 - Cold-Formed Metal Framing
- C. Section 06 20 00 - Finish Carpentry.
- D. Section 06 41 00 – Architectural Wood Casework
- E. Section 09 68 13 - Tile Carpeting
- F. Section 09 70 00 - Vinyl -Coated Fabric Wall Coverings
- G. Section 09 91 00 - Painting - Interior and Exterior
- H. Division 26 - For new and existing electrical work installed in casework.
- I. Work may be required to be coordinated with other sections

1.3 REFERENCES

- A. AWS – Architectural Woodwork Standards, 1st Edition, 2009
- B. National Sanitation Foundation standards.
- C. ASTM C 501 - Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abrader.
- D. ASTM D 256 - Impact Resistance of Plastics and Electrical Insulating Materials.
- E. ASTM D 570 - Water Absorption of Plastics.
- F. ASTM D 638 - Tensile Properties of Plastics.
- G. ASTM D 696 - Coefficient of Linear Thermal Expansion of Plastics.

- H. ASTM D 2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impresser.
- I. ASTM E 84- Surface Burning Characteristics of Building Materials.
- J. National Electrical Manufacturers Association (NEMA) LD.3 High Pressure Decorative Laminates.

1.4 SUBMITTALS

- A. Provide submittals under provisions of Section 01 33 00.
- B. Product and Material Data
 - 1. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes. Include seaming plan of all countertop materials.
 - 2. Coordinate with fittings, including sinks and faucets specified in other Sections.
- C. Provide Woodwork Institute (WI) Certified Compliance documents as specified.
 - 1. Provide WI Certified Compliance label on shop drawings.
 - 2. Provide WI Certified Compliance Certificate prior to delivery to job site.
 - 3. Provide WI Certified Compliance Label on all casework and countertops.
- D. Samples
 - 1. Prior to fabricating mock-up, provide minimum 12 x 12 inch samples of each color and finish.
 - 2. Incorporate all selections in mock-up.

1.5 QUALITY ASSURANCE

- A. Provide fabricator specializing in the fabrication of specified solid surfacing countertops, be accredited by manufacturer, with a minimum of five years documented experience, including completion of projects of similar scope within past 12 months.
- B. Perform work in accordance with WI Architectural Woodwork Standards (AWS), Section 10 Casework, Section 11 Countertops, and as required by this Section.
 - 1. Where more restrictive than referenced standards, comply with requirements of this Section.
- C. Issue a WI Certified Compliance Certificate prior to delivery certifying that products fully meet all the requirements of the AWS Grade specified.
- D. After completion, issue a WI Certified Compliance Certificate for Installation certifying that products fully meet all the requirements of the AWS Grade specified.
- E. Review all fixtures and fittings specified in other sections to verify fit and alignment. Countertop fabricator is responsible for coordinating all components, including plumbing and electrical components, into a fully functional assembly complying with specified criteria.

1.6 DELIVERY AND STORAGE

- A. Deliver work in this section only at such time as the work is ready and suitable for installation.
- B. Comply with requirements of AWS, Section 2 and 11, and manufacturers published criteria.

1.7 CONTRACTORS GUARANTY

- A. Provide Owner with written Guarantee on Contractor's letterhead, and signed by General Contractor and cast plastic fabricator.
- B. Provide guarantee for a time period of three years, commencing from the date of final acceptance of the project.
- C. Provide guarantee against defects in fabrication and performance, including cracking and spalling of surface from contact with hot or cold materials, and against staining in excess of the specified limits.
- D. Restore the affected areas to the standard of the original specifications as soon as weather permits.

1.8 MANUFACTURERS WARRANTY

- A. Provide Owner with manufacturers commercial guarantee written on company letterhead, warranting repair or replacement of cast plastic components.
- B. Provide warranty covering cost of labor in such repair or replacement activities.
- C. Provide warranty against manufacturing defects for a period of 10 years after installation.

PART 2 - PRODUCTS

2.1 PRODUCT AND PERFORMANCE CHARACTERISTICS:

- 1. Radiant heat: minimum 600 seconds value per NEMA LD-3-3.5.
- 2. Flexural Strength: 9,300 psi per ASTM Method D 790.
- 3. Barcol Hardness: 61 per ASTM D 2583.
- 4. High Temperature Resistance: No change per NEMA LD-3-3.6.
- 5. Boiling Water Surface Resistance: No change per NEMA LD-3-3.5.
- 6. Impact Resistance: No breakage from 1/2 pound ball, 144 inch drop, 1/2 material per NEMA LD3-3.03 / ISSFA SST 6.1-00 procedure
- 7. Light Resistance: No change per ISSFA SST 7-1.00.

- B. Chemical Reagent Resistance – SS-1 Solid Surface Materials: Provide chemical and stain resistance as published by manufacturer for Arctic White color. After exposure to the published reagents, both covered and uncovered, any stain shall be removed by scrubbing with a wet Scotch Brite pad and bleaching cleanser. There shall be no permanent marring or crazing of surface.
- C. Fire, Life Safety and Habitability Criteria:
1. Flame Spread: Maximum value of 20, 1/4 inch thickness, per ASTM E 84.
 2. Smoke Developed: Maximum value of 15, 3/4 inch thickness, per ASTM E 84.
 3. Toxicity: Maximum value of 99 grams, solid colors and 66 grams Sierra colors per Pittsburgh Protocol or approved equivalent.
 4. Disinfection Ability: Demonstrated ability to remove HIV from surface.
 5. Mold and Fungus Resistance: No mold or fungus growth after 6 month exposure.
- D. Accessories:
1. Adhesives: Color matched adhesive as recommended by manufacturer.
 2. Sealants: Silicone type, acid resistant, as recommended by top manufacturer for fixture applications.
- E. Configuration:
1. Thickness: Minimum 1/2 inch, with additional thickness as shown on drawings.
 2. Edge: As shown on drawings.
 3. Splash: As shown on drawings.
 4. Finish: Matten with a 60 degree gloss rating of 5 - 20

2.2 SOLID SURFACE SS-1

- A. Manufacturer: Corian® by DuPont; www.corian.com, or equal.

Contact Form: <https://www.corian.com/-contact-us-form->

Product Representative: Willis, www.4willis.com

Address: 1905 N. MacArthur Drive, Tracy, CA 95376. Phone: (209) 835-2126

1. Type: Acrylic polymer, aluminum trihydrate filler and pigment. Through-body color for full thickness of sheet material.
 - a. Provide solid surfacing conforming to AWS Section 10 and 11, Premium grade, modified as specified in this Section.
2. Color: As shown on drawing Finish Legend Substitutions: Provide per Section 01 25 00, “Substitution Procedures”

2.3 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

2.4 FABRICATION – SS-1

- A. Fabricate solid surfacing conforming to AWS Premium grade.
- B. Fabricate solid surfacing conforming to AWS Premium grade and manufacturer's recommendations.
- C. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
- D. Counter Perimeter Frame: Ensure 3/4" thick exterior grade plywood with waterproof adhesive, Fir or Poplar plywood, veneer core only.
- E. Form joints between components using manufacturer's recommended joint adhesive without conspicuous joints.
- F. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
- G. Rout and finish component edges with clean, sharp returns.
 - 1. Rout cutouts, radius and contours to template.
 - 2. Smooth edges.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3. In the event of discrepancy, immediately notify the Architect.
 - 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION - COUNTERTOPS

- A. Set and secure countertops in accordance with AWS, Section 11.

- B. Set all counters level, square and in true alignment. Counters shall fit tightly to walls and upon completion of installation shall show no marks, indentations, or other defects. Furnish all fillers, trim and molding required for finished installation.
- C. Install countertops in accordance with manufacturer's procedures and recommendations.

3.3 CLEANING

- A. Clean surfacing and fixtures per manufacturers instructions and per Section 01 77 19.

END OF SECTION

SECTION 07 13 26

SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1. SUMMARY

- A. Section Includes:
 - 1. Modified Bituminous Sheet Waterproofing.
 - a. General underlayment.
 - b. Roofing underlayment.
 - c. Flexible membrane flashing.
 - d. Molded Sheet Drainage Panels.

1.2. RELATED SECTIONS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 06 10 00 - Rough Carpentry (plywood sheathing)
- C. Section 07 25 00 - Weather Barriers
- D. Section 07 92 00 - Joint Protection

1.3. REFERENCES (Current Edition of All Referenced Standards)

- A. ASTM International
 - 1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
 - 2. ASTM C1193 – Standard Guide for Use of Joint Sealants
 - 3. ASTM D412- Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - 4. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - 5. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - 6. ASTM D3767 - Standard Practice for Rubber - Measurement of Dimensions.
 - 1. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - 7. ASTM D5957 - Standard Guide for Flood Testing Horizontal Waterproofing Installations
 - 8. ASTM D6506 - Standard Specification for Asphalt Based Protection Board for Below-Grade Waterproofing
 - 9. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials
 - 10. ASTM E96/ E96M - Standard Test Methods for Water Vapor Transmission of Materials

2. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
 3. ASTM E1677 - Specification for Air Retarder Material or System for Framed Building Walls
 4. ASTM E1186 – Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
 5. ASTM E2112 - Standard Practice for Installation of Exterior Windows and Doors
 6. ASTM E2178 - Test Method for Air Permeance of Building Materials
 7. ASTM E2266 Standard Guide for Design and Construction of Low-Rise Frame Building Wall Systems to Resist Water Intrusion
 8. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
 11. ASTM G90 – Standard Practice for Performing Accelerated Outdoor Weathering of Materials Using Concentrated Natural Sunlight
- B. American Association of Textile Chemists & Colorists (AATCC)
1. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test
- C. EMMA/EMMAQUA test.
- D. ICC-ES ESR-3121 – Self-Adhering Membrane
- E. NRCA (National Roofing Contractors Association) - Waterproofing Manual.
- F. Underwriters Laboratory (UL) Fire Resistance Directory

1.4. SUBMITTALS.

- A. Submit product data under provisions of Section 01 33 00, “Submittal Procedures”.
- B. Submit product data for all materials used in system, including primers, membrane material, flexible flashing, and joint and crack sealants. Provide written certification of current VOC approval of all products used in system.
- C. Accompanying product data, submit complete installation methods, with temperature range for application of waterproofing membrane.
- D. Accompanying product data, submit letter certifying compatibility and acceptability of specified substrate, including preparation, for selected waterproofing system.

1.5. QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
- B. Mockups: Build mockups to verify selections made under sample submittals and to set quality standards for installation.
 1. Build for each typical waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.
 - a. Description: Each type of wall installation.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6. PRE-INSTALLATION CONFERENCE

- A. Preinstallation Conference: Conduct conference at “TBD”
 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.7. ENVIRONMENTAL REQUIREMENTS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8. WARRANTY

- A. Contractor's Guarantee:
 1. Provide Owner with written Guarantee on Contractor's letterhead and signed by General Contractor and waterproofing system subcontractor.
 2. Provide guarantee for a time period of three years, commencing from the date of final acceptance of the project, against the following defects or failures:
 - a. Membrane delamination from substrate.
 - b. Free water penetration through membrane and substrate.
 - c. Water vapor transmission through membrane in excess of specified characteristics.
 3. Make inspections and emergency repairs to defects or leaks in the waterproofing system within twenty-four (24) hours of receipt of notice from the Owner.
 4. Restore the affected areas to the standard of the original specifications as soon as weather permits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Minimum 60-mil. nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side[; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction].
1. Basis-of-Design – Underlayment:
 2. Acceptable Products, or equal for all listed:
 - a. For General Waterproofing:
 - 1) GCP Applied Technologies, Bituthene 4000, or equal. Contact Matt Miller, Product Representative. Phone - (408) 421-1334. Website: <https://gcpat.com/en/solutions/products/bituthene-post-applied-waterproofing/bituthene-4000-membrane>
 - 2) Carlisle Coatings and Waterproofing Inc., CCW MiraDRI 860/861, or equal. Phone - (800) 527-7092. Website: <https://www.carlisleccw.com/category.aspx?category=150>
 - 3) Henry Company, Blueskin WP 200, or equal. Phone - (800) 486-1278. Website: <https://henry.com/residential-and-light-commercial/foundation-and-below-grade/blueskin-wp200>.
 - b. For Roofing Underlayment:
 - 1) GCP Applied Technologies, Ice and Water Shield HT, or equal. Contact Matt Miller, Product Representative. Phone - (408) 421-1334. Website: <https://gcpat.com/en/solutions/products/grace-ice-water-shield-roofing-underlayment/grace-ice-water-shield-ht-us-version>
 - 2) Imetco, Aquablock 60, or equal. Phone - (800) 646-3826. Website: <https://imetco.com/products/roof-cladding-systems/roof-underlayments/>
 3. Basis-of-Design – Flexible Membrane Flashing At Penetrations:
 - a. GCP Applied Technologies, Vycor 40, or equal. Contact Matt Miller, Product Representative. Phone - (408) 421-1334. Website: <https://ca.gcpat.com/en/solutions/products/vycor-weather-barrier-flashing-tapes/vycor-v40>
 - b. GCP Applied Technologies, Perm A Barrier Wall Flashing, or equal. Contact Matt Miller, Product Representative. Phone - (408) 421-1334. Website: <https://gcpat.com/en/solutions/products/perm-a-barrier-air-barrier-system/perm-a-barrier-wall-flashing>

- c. DuPont™ FlexWrap™, or equal: Flexible membrane flashing materials for window openings and penetrations.

Website Link: <https://www.dupont.com/products/dupont-flexwrap.html>

- d. DuPont™ StraightFlash™, or equal: Straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc.

Website Link: <https://www.dupont.com/products/dupont-straightflash.html>

- e. DuPont™ Thru-Wall Surface Adhered Membrane with Integrated Drip Edge, or equal: Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
- f. DuPont™ Preformed Inside and Outside Corners and End Dams, or equal: Preformed three-dimensional shapes to complete the flashing system used in conjunction with DuPont™ Thru-Wall Flashing.

- 1. Substitutions per Section 01 25 00, “Substitution Procedures”

B. Materials: Self-Adhering Sheet Membrane Underlayment shall comply with the following characteristics:

- 1. Material: Cold applied, self-adhering membrane composed of an innovative and proprietary rubberized asphalt adhesive and interwound with a disposable release sheet. An embossed, slip resistant surface is provided on the high-performance film with UV barrier properties.
- 2. Membrane Thickness: 60 mils (1.02 mm) per ASTM D3767 Method A.
- 3. Membrane Tensile Strength: MD 33 lbf/in, CD 31 lbf/inch per ASTM D412 Die C Modified.
- 4. Membrane Elongation: 250% per ASTM D412 Die C Modified.
- 5. Low Temperature Flexibility: Unaffected at -20 degrees F (-29 degrees C) per ASTM D1970.
- 6. Adhesion to Plywood: 5.0 lb/in. width (876 N/m) per ASTM D903.
- 7. Maximum Permeance: 0.05 perms (2.9 ng/sgms Pa) per ASTM E96.
- 8. Maximum Material Weight Installed: 0.22 pounds/sqft (1.1 kg/sqm) per ASTM D461.
- 9. Service Temperature: 260 degrees F (115.6 degrees C) per ASTM D1204
- 10. Compatibility: Suitable for use under all types of sloped roofing with the exception high altitude climates where zinc, copper or Cor-Ten roof coverings are used.
- 11. Adhesive: Rubberized asphalt adhesive containing post-consumer recycled content, contains no calcium carbonate, sand or fly ash.
- 12. Exposure: Can be left exposed for a maximum of 120 days from date of installation per ASTM G90 – EMMAQUA test.
- 13. Primer: Water-Based Perm-A-Barrier WB Primer by GCP Applied Technologies, Inc.
Website: <https://gcpat.com/en/solutions/products/perm-a-barrier-air-barrier-system/perm-a-barrier-wb-primer>
- 14. Code and Standards Compliance: GCP Applied Technologies Ice and Water Shield HT meets the following requirements:

- a. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - b. Underwriters Laboratories Inc. Classified Sheathing Material Fire Resistance Classification with Roof Designs: P225, P227, P230, P237, P259, P508, P510, P512, P514, P701, P711, P717, P722, P723, P732, P734, P736, P742, P803, P814, P818, P824
 - c. ICC-ES ESR-3121, per AC 48 Acceptance Criteria for Roof Underlayments used in Severe Climate Areas.
15. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by sheet-waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers.
- G. Protection Course: ASTM D 6506, semi-rigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 1. Thickness: Nominal 1/8 inch.
 2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.

2.4 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 16 gpm per ft.
 1. Basis-of-Design Product – Or equal:
 - a. GCP Applied Technologies Inc., Hydroproduct 220 – Website Link - https://coastalone.com/media/wysiwyg/Data_Sheets/Grace_Hydroduct_220_Product_Data_Sheet.pdf

- b. BASF Corporation; Construction Systems, MasterSeal® 974, 975 and 976. Website Link - <https://assets.master-builders-solutions.basf.com/en-us/basf-masterseal-974-975-976-tds.pdf>
2. Substitutions per Section 01 25 00, “Substitution Procedures”

PART 3 - EXECUTION

1.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.2 PREPARATION

- A. Clean and prepare surfaces to receive waterproofing, in accordance with manufacturer's instructions.
- B. Apply recommended system components to seal penetrations, small cracks, and honeycomb in substrate.
- C. Protect adjacent surfaces not designated to receive waterproofing.
- D. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

1.3 WATERPROOF MEMBRANE UNDERLAYMENT INSTALLATION:

- A. Prepare substrate as recommended by manufacturer.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Installation: Where applies, install roofing underlayment on sloped surfaces at locations indicated on the Drawings, but not less than at hips, ridges, eaves, valleys, sidewalls and chimneys, and surfaces over interior space within 36 inches from the inside face of the exterior wall. Strictly comply with manufacturer’s installation instructions including but not limited to the following:
- D. Schedule installation such that underlayment is covered by roofing within the published exposure limit of the underlayment.

- E. Do not install underlayment on wet or frozen substrates.
 - F. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - G. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
 - H. Remove dust, dirt, loose materials and protrusions from deck surface.
 - I. Install membrane on clean, dry, continuous structural deck. Fill voids and damaged or unsupported areas prior to installation.
 - J. Install membrane such that all laps shed water. Work from the low point to the high point of the roof at all times. Apply the membrane in valleys before the membrane is applied to the eaves. Following placement along the eaves, continue application of the membrane up the roof. Membrane may be installed either vertically or horizontally after the first horizontal course.
 - K. Side laps minimum 3-1/2 inches (89 mm) and end laps minimum 6 inches (152 mm) following lap lines marked on underlayment.
 - L. Patch penetrations and damage using manufacturer's recommended methods.
 - M. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Re-prime areas exposed for more than 24 hours.
 - N. Two-Ply Application: Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths, to provide a minimum of two thicknesses of sheet membrane over areas to receive waterproofing.
 - O. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
 - P. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
 - Q. Seal edges of sheet-waterproofing terminations with mastic.
 - R. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
 - S. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fish-mouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
 - T. Immediately install protection course with butted joints over waterproofing membrane.
 - U. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.
- 1.4 FLASHING (for use with non-flanged windows – all cladding types)
- A. Follow manufactures written instructions, provide compatible primers to substrates where required.
 - B. Conceal water-resistive barrier system components under exterior wall claddings and finishes, do not leave them exposed to ultraviolet light.

- C. Provide self-adhered flashing under all sheet metal flashings, and install in a continuous water-tight manner with the building water-resistant barrier membrane.
- D. Provide high heat-resistant type self-adhered flashings and self-adhered membrane under sheet metal flashings exposed to high heat conditions such as under sheet metal copings exposed to the sun.
- E. Handroll self-adhered membranes and flashings with a rolling tool and use required pressure to eliminate blisters and wrinkles, and to ensure well-adhered, watertight laps.
- F. Sequence the installation of horizontal self-adhered flashings and membranes to avoid reverse laps and to promote drainage.
- G. Cut 9-inch wide flexible membrane flashing a minimum of 12 inches longer than width of sill rough opening.
- H. Cover horizontal sill by aligning flexible membrane flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
- I. Fan flexible membrane flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges. Mechanically fastening flexible membrane flashing is not required.
- J. Apply 9-inch wide strips of straightflash membrane flashing at jambs. Align flashing with interior edge of jamb framing. Start straightflash membrane flashing at head of opening and lap sill flashing down to the sill.
- K. Spray-apply primer to top 6 inches of jambs and exposed sheathing.
- L. Install flexible membrane flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
- M. Coordinate flashing with window installation.
- N. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.
- O. Position weather barrier head flap across head flashing. Adhere using 4-inch wide straightflash membrane flashing over the 45-degree seams.
- P. Tape top of window in accordance with manufacturer recommendations.
- Q. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193.

1.5 THRU-WALL FLASHING INSTALLATION

- A. Apply primer per manufacturer's written instructions – see Section 07 25 00, "Weather Barriers".
- B. Install preformed corners and end dams bedded in sealant in appropriate locations along wall.
- C. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.
- D. Extend membrane through wall and leave ¼ inch minimum exposed to form drip edge.

- E. Roll flashing into place. Ensure continuous and direct contact with substrate.
- F. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.
- G. Trim exterior edge of membrane 1-inch and secure metal drip edge per manufacturer's written instructions.
- H. Terminate membrane on vertical wall. Terminate into reglet, counterflashing or with termination bar.
- I. Apply sealant bead at each termination.

1.6 THRU-WALL FLASHING/WEATHER BARRIER INTERFACE AT BASE OF WALL

- A. Overlap thru-wall flashing with weather barrier by 6-inches.
- B. Mechanically fasten bottom of weather barrier through top of thru-wall flashing.
- C. Seal vertical and horizontal seams with tape or sealing membrane.

1.7 THRU-WALL FLASHING/WEATHER BARRIER INTERFACE AT SHELF ANGLE

- A. Seal weather barrier to bottom of shelf angle with sealing membrane.
- B. Apply thru-wall flashing to top of shelf angle. Overlap thru-wall flashing with weather barrier by 6-inches.
- C. Seal bottom of weather barrier to thru-wall flashing with tape or sealing membrane.

1.8 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT WINDOW HEAD

- A. Cut flap in weather barrier at window head.
- B. Prime exposed sheathing.
- C. Install lintel as required. Verify end dams extend 4 inches minimum beyond opening.
- D. Install end dams bedded in sealant.
- E. Adhere 2 inches minimum thru-wall flashing to wall sheathing. Overlap lintel with thru-wall flashing and extend ¼ inch minimum beyond outside edge of lintel to form drip edge.
- F. Apply sealant along thru-wall flashing edges.
- G. Fold weather barrier flap back into place and tape bottom edge to thru-wall flashing.
- H. Tape diagonal cuts of weather barrier.
- I. Secure weather barrier flap with fasteners.

1.9 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.
- B. Flood Testing: Flood test each deck area for leaks, according to procedures in ASTM D5957, after completing waterproofing but before placing overlying construction. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and a maximum depth of 4 inches. Maintain 2 inches of clearance from top of sheet flashings.
 2. Flood each area for 72 hours.
 3. Testing agency shall observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.
 4. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
- C. Electronic Leak-Detection Testing:
1. Testing agency shall test for leaks using an electronic leak-detection method that locates discontinuities in the waterproofing membrane.
 2. Testing agency shall perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.
 3. Testing agency shall create a conductive electronic field over the area of waterproofing to be tested and electronically determine locations of discontinuities or leaks, if any, in the waterproofing.
 4. Testing agency shall provide survey report indicating locations of discontinuities, if any.
- D. Waterproofing will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

1.10 PROTECTION, REPAIR, AND CLEANING

- A. Thoroughly inspect and repair defects in water-resistive barrier system components, from spinners and shiners (removed or abandoned fasteners that miss supports), unsealed holes from removed fasteners, scaffold tie-backs, tears, delaminations, and any other condition that would allow bulk water intrusion beyond the water-resistive barrier system into the building, before concealment with wall claddings.
- B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- C. Do not permit foot or vehicular traffic on unprotected membrane.
- D. Protect waterproofing from damage and wear during remainder of construction period.
- E. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- F. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION

SECTION 07 19 00
WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:
 - 1. Cast-in-place concrete.
 - 2. Concrete unit masonry.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 PENETRATING WATER REPELLENTS

- A. Siloxane, Penetrating Water Repellent: Clear, containing 10 percent or more solids of oligomeric alkylalkoxysiloxanes; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with 400 g/L or less of VOCs.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide H&C Concrete Care Products, Sherwin-Williams Company (The); H&C Concrete & Driveway Protector or comparable product by one of the following:
 - a. Concrete Sealers USA.
 - b. Dayton Superior.
- B. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 400 g/L or less of VOCs.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide BASF Corporation; Construction Systems; MasterProtect H 107 (Pre-2014: Enviroseal 7) or comparable product by one of the following:
 - a. Euclid Chemical Company (The); an RPM company.
 - b. PROSOCO, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
 - 1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in representative locations by method recommended by manufacturer.
 - 2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
 - 3. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.

3.2 PREPARATION

- A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, according to repellent manufacturer's written instructions.
- B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions
- C. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.
- D. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

3.3 APPLICATION

- A. Apply coating of water repellent on surfaces to be treated using low-pressure spray to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.
- B. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.4 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION

SECTION 07 21 00
THERMAL AND ACOUSTICAL INSULATION

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Batt acoustical insulation for interior wall and ceiling construction.
- B. Batt thermal insulation for exterior wall and ceiling construction.
- C. Board insulation for exterior metal wall panels.
- D. Board insulation for exterior cement plaster system.

1.2. RELATED SECTIONS

- A. Section 07 13 26 – Self-Adhering Sheet Waterproofing.
- B. Section 07 22 00 – Roof Deck Insulation - For Roofing Rigid Insulation Above Metal Deck – thickness and densities described in drawings.
- C. Section 07 25 00 - Weather Barriers
- D. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.3. REFERENCES (Current Edition for All Standards Listed)

- A. American Associate of Textile Chemists and Colorists (AATCC) - Test Method 127
- B. American Society For Testing and Materials (ASTM) International:
 - 1. ASTM C177 - Standard Test Method For Steady-State Heat Flux Measurements And Thermal Transmission Properties By Means Of The Guarded-Hot-Plate Apparatus
 - 2. ASTM C203 - Standard Test Methods for Breaking Load and Flexural Properties of Block Type Thermal Insulation.
 - 3. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
 - 4. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
 - 5. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 6. ASTM C578 -Standard Specification For Rigid, Cellular Polystyrene Thermal Insulation
 - 1) ASTM C612 - Standard Specification For Mineral Fiber Block And Board Thermal Insulation.
 - 2) ASTM C665 - Standard Specification For Mineral-Fiber Blanket Thermal Insulation For Light Frame Construction And Manufactured Housing.
 - 7. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

8. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
 9. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
 10. ASTM E84 - Standard Test Method For Surface Burning Characteristics Of Building Materials
 11. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
 12. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.
 13. ASTM2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
- C. Air Barrier Association of America (ABAA):
- D. 2016 California Building Code (CBC), Title 24 – Sections as referenced.
- E. Factory Mutual Global (FMG) - FMG 4470
- F. International Code Council - Evaluation Service:
1. ICC-ES AC12 - Acceptance Criteria for Foam Plastic Insulation
 2. ICC-ES AC71 - Foam Plastic Sheathing Panels Used as Weather-Resistive Barriers.
 3. ICC-ES Evaluation Report ESR-3398 - Johns Manville AP Foil-Faced Sheathing.
- G. National Fire Protection Association (NFPA):
1. NFPA 259 - Standard Test Method for Potential Heat of Building.
 2. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components Underwriters Laboratories (UL and ULC): Audit manual - File R10167.
- H. FMG 4470 – Approval Standard for Class 1 Insulated Steel Deck Roofs.
- I. Underwriter’s Laboratory UL File No. R101067 (for John Mansville product specified, or equal)

1.4. SUBMITTALS

- A. Materials List:
1. Submit materials list in accordance with Section 01 33 00, “Submittal Procedures”.
 2. Prepare complete materials list identifying specific insulation types and applications.
 3. Provide agency approval documentation, including ICBO ES reports, State Fire Marshal Listing, or other approvals.
- B. Product Data: Submit manufacturer’s product data sheets including the following:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. ICC-ES Evaluation Report: Submit current ESR-3398, Johns Manville AP Foil-Faced Sheathing.

- D. Samples: Submit 12 inch square insulation panel.

1.5. PERFORMANCE REQUIREMENTS

- A. Comply with CBC, Title 24, Part 2, Chapter 7, fire resistivity ratings.

1.6. QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by insulation system manufacturer to install manufacturer's product.
- B. Manufacturer Qualifications: A qualified manufacturer that has ASTM C1289, NFPA 285, and ASTM E84 listing for continuous insulation system identical to that used for this Project.
- C. Preconstruction Meeting: Before installation, conduct conference at Project site. Comply with requirements for pre-installation conferences in Section 01 31 00, " Project Management Coordination" Review methods and procedures related to continuous insulation construction and including the following:
 - 1. Meet with Owner, Architect, Installer, manufacturer's representative, and installers that interface with or affect the installation of continuous insulation sheathing.
 - 2. Review metal wall framing and roofing assemblies for potential interference and conflicts.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review continuous insulation sheathing guidelines as require by Manufacturer's installation manual.
 - 5. Review governing regulations and requirements for insurance and certificates if applicable.

1.7. DELIVERY, STORAGE, AND HANDLING

- A. Deliver insulation materials to project site with original packaging unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and installing with other components.
- B. Store materials in clean, dry area in manufacturer's unopened packaging until ready for installation and in accordance with manufacturer's instructions and temperature recommendations. Packaging shall be intact with no exposed foam or loose flaps, labels and feet/legs must be securely affixed.
- C. Handle and store insulation materials in a manner to avoid damaging materials.

1.8. PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit system to be installed according to manufacturer's written instructions and warranty requirements.

1.9. DELIVERY, STORAGE, AND HANDLING

- A. Protection:
 - 1. Deliver, store and handle all products in a manner to prevent damage and deterioration.
 - 2. Use all means necessary to protect the installed work and materials of all other trades.

3. Deliver all materials in unopened bundles, labeled with date of manufacturer and testing agency approval.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance.
- B. The Architect will consider requests for substitutions, under the provisions of 01 25 00, "Substitution Procedures".
- C. Contacts – Basis of Design:
 1. Sales Representative: Dwight Stone, MBA, AIAa, CDT, Product Representative.
Phone – (720) 315-6956. E-mail - Dwight.Stone@jm.com
 2. Technical Representative: Jeffrey Job. Phone: (303) 978-2434.
E-mail: Jeffrey.job@jm.com

2.2. FIBERGLASS BATT ACOUSTICAL INSULATION

- A. Manufacturer: Johns Manville, www.jm.com, or equal.
- B. Type: Glass fiber batt, friction fit, unfaced.
- C. Construction:
 1. Blanket: Glass Fiber, Type 1 per ASTM C665
 - a. Provide formaldehyde free insulation with acrylic binder.
 - b. Provide minimum 25 percent total recycled content, with minimum 18 percent post-consumer recycled content.
 2. Facing: None.
 3. Thickness: At interior walls – R-11, unfaced.
- D. Fire/Habitability Criteria:
 1. Flame Spread Classification: Maximum 25 per ASTM E84
 2. Smoke Developed Classification: Maximum of 50 per ASTM E84
 3. Thermal Resistance: Minimum R-11 per ASTM C177 or C518.
- A. Substitutions for all products listed this Section per Section 01 25 00, "Substitution Procedures"

2.3. FIBERGLASS BATT THERMAL INSULATION & ACCESSORIES

- A. Manufacturer: Johns Manville, www.jm.com, or equal.
 1. Within Closed Wall Cavity: R-19 pre-formed kraft-faced fiberglass batts at all exterior walls.
 2. Exterior Wall Batt Insulation Exposed to Spaces Above Ceiling: R-19 Preformed foil-faced fiberglass batts at all exterior walls.

3. In All Exterior Soffits: Unfaced batts, in thicknesses sufficient to fill the entire cavity – see drawings.
 4. At Mechanical Curbs – As described in drawings – see architectural roof details and mechanical roof details for reference.
 5. Where Required At Mech Curbs: Wire mesh, 1 ½” x 17 ga. poultry netting.
 6. Nails, Staples and Self-Tapping Screws – Steel wire, electroplated – size and length to meet required conditions, or as specifically noted in details.
 7. Vapor Retarder: Vapor-relief strips, as recommended by insulation manufacturer.
 - a. See Section 07 25 00, “Weather Barriers” for exterior weather barriers.
 8. Accessories: Provide as recommended by installation manufacturer for all insulation types listed and substrates.
- B. Construction:
1. Blanket: Glass Fiber per ASTM C665.
 2. Exposed Facer: Provide reinforced foil facing, with stapling flange, with maximum 25 flame spread classification and maximum 450 smoke contributed classification where facer is not in substantial contact with the unexposed surface of the ceiling finish. Required in Type 1/11 Buildings
 3. Concealed Facer: un-faced insulation without fire and smoke rating where facer is in substantial direct contact with unexposed surface of wall finish. Kraft paper using this exception only acceptable only in Type III/IV/V buildings.
- C. Fire/Habitability Criteria
1. Flame Spread Classification: Maximum 25 per ASTM E84
 2. Smoke Developed Classification: Maximum of 50 per ASTM E84
 3. Thermal Resistance: R-19 value, per ASTM C177 or C518.
 4. Perm Rating (Foil facer): Maximum 0.02 grains/hr./sf/in Hg per ASTM C665.
 5. Perm Rating (Kraft facer): Maximum 1.0 grains/hr./sf/in Hg per ASTM C665.
- D. Substitutions for all products listed this Section per Section 01 25 00, “Substitution Procedures”.

2.4 POLYISOCYNAURATE FOAMINSULATION

A. Polyisocyanurate Board Insulation:

1. Basis of Design:

AP Foil-Faced Rigid Foam Sheathing, manufactured by Johns Manville www.jm.com, or equal, complying with the following:

- a. Description: Foil-faced, rigid foam insulating sheathing product recommended for concealed uses in commercial and residential construction, complying with ASTM C 1289, Type 1, Class 1 or 2.
- b. Construction: Foam bonded on both sides in the manufacturing process to foil facers. One side has a printed reflective foil facer and the other side has a printed non-reflective foil facer.

- c. Foam: Closed cell polyisocyanurate, CFC- and HCFC-free.
 - d. Service Temperature: -100 degrees F to 250 degrees F (-73 degrees C to 122 degrees C).
 - e. Physical Properties:
 - 1) Thermal Resistance, 1 Inch, ASTM C518: 6.0 degrees F per square foot per hour per BTU.
 - 2) Compressive Strength, ASTM D1621: 16 psi or greater.
 - 3) Flexural Strength, ASTM C203: 40 psi or greater.
 - 4) Water Absorption, ASTM C209: 0.1 percent by volume.
 - 5) Water Vapor Permeance, ASTM E 96, 0.05 perms.
 - 6) Surface Burning Characteristics, ASTM E84, foam core 25 or less flame spread, 450 or less smoke developed.
2. Size: 48 inches wide by 96 inches long. Refer to the drawings and description below for required thicknesses.
- a. Insulation Boards At Metal Wall Panels – See Related Section 07 42 13.13- Formed Metal Wall Panels.
 - 1) Nominal Thickness: 1.00 inch, R-value 6.0.
 - b. Insulation Boards At Cement Plaster System – See Related Section 09 24 00.10 - Integral Color Portland Cement Plastering:

OTHER AVAILABLE SIZES:

 - 1) **Nominal Thickness: 1.20 inch, R-value 7.5.**
3. Compliance: Third party quality control agency follow-up service requirements:
- a. Underwriters Laboratories: Must comply with current UL File R10167 audit manual at manufacturing locations.
 - b. Factory Mutual: Tested per ASTM E84 Test Method for Surface Burning Characteristics.
 - c. Intertek: Complies with ASTM C1289, ASTM E84, NFPA 259, and NFPA 285 requirements.
 - d. AATCC Test Method 127: Accepted; weathered specimens do not exhibit water leakage on the underside of any specimen tested.
 - e. ASTM Test Methods and Specifications:
 - 1) ASTM D2126 (Dimensional Stability): 2 percent maximum linear change at minus 40degF/amb. R.H. and at 158degF/97percent R.H, 4 percent maximum linear change @ 200°F/amb. R.H.
 - 2) ASTM E2178: Air permeance average, with differential pressure of 75 Pa (1.57 lbs./sq. ft), resulting in calculated air flow of 0.0007 L/second sq.m (0.00013 cfm/sq. ft.).

- 3) ASTM E2357: Air leakage rating of 0.00426 liters per second square meter, with the specified design value of Q_{sub10} greater than 0.20 kPa.
- f. ICC-ES AC71: Foam plastic sheathing panels used as weather-resistive barriers.
 - 1) Foam Insulation - Water Resistance (Modified): No water observed on underside of specimens after aging.
 - 2) Wall Assembly Water Penetration Resistance Testing: No water observed penetrating to the unexposed face of the wall assembly.
- g. Air Barrier Association of America (ABAA): ABAA approved material.
4. Accessories:
 - a. Insulation Flashing Tape:
 - 1) JM UltraFast® Flashing Tape, or equal.
 - 2) 3M All Weather Flashing Tape 8067, or equal.
 - b. Wall Penetration Sealant:
 - 1) Tremco Spectrum 1, or equal.
5. Insulation Fasteners:
 - a. JM UltraFast CI Plates, or equal. and
 - b. JM Ultrafast CI Phillips screws, or equal.
6. Fasteners:
 - a. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening wall insulation to substrate, and furnished by insulation manufacturer.
 - (1) Basis of Design: Fasteners: JM Ultrafast CI Plates and JM Ultrafast CI Phillips screws, or approved Equal. Website Link: <https://www.jm.com/en/commercial-roofing/fasteners-and-plates/>
7. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.
8. Substitutions for all products listed this Section per Section 01 25 00, "Substitution Procedures".

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

- A. Install insulation in accordance with insulation manufacturer's instructions and as specified.
- B. Install faced insulation with facing to occupied room side. Install non-rated facing in contact with unexposed surface of finish materials.
 1. At floors over unconditioned crawl space, install insulation with facing towards crawl space.
- C. Do not install insulation over recessed light fixtures.
- D. Trim insulation neatly to fit spaces. Fit insulation into crevices, spaces at outlet boxes and similar penetrations.
- E. Maintain continuous foil faced vapor barrier. Provide fire resistive tape at all edges or penetrations of foil faced insulation, including batt ends.
- F. Where wall insulation cavity exceeds 8 feet high, provide blocking or other approved support at 8 feet on center.
- G. Wire Lacing Support Method:
 1. Provide wire lacing method at floor and roof insulation where spacing of framing members exceeds batt width.
 2. Provide wire lacing diagonally at bottom of joist cavity, fastened 16 inches on center, staggered, and fastened to each joist in an approved manner.
 3. Adjust lacing as necessary to provide taut and consistent support for insulation batts.
 4. Install insulation on lacing supports. Provide additional wire lacing at unsupported ends of batts.
 5. Tape all batt ends and penetrations.

3.3 FOAM-PLASTIC SHEATHING INSTALLATION

- A. Comply with manufacturer's written instructions:
 1. Begin installation after structural steel and exterior framing and bracing are complete.
 2. Install boards horizontally (preferred) using maximum board length to minimize the number of joints. The reflective side of the board should be oriented to the exterior, and the non-reflective white side should be oriented to the interior. Locate joints parallel to framing flange. Stagger each course at least one stud space to minimize continuous vertical seams. Boards may be installed vertically if less seam sealing results.
 3. Fasten insulation boards to the exterior face of the stud framing using recommended fasteners. Fasteners must be long enough that at least three full threads are visible inside the wall framing.
 4. Space fasteners 16 inches on center at the board perimeter, and 16 inches on center in the field of the board. One fastener/plate can bridge between a maximum of two adjoining board

edges. Drive fasteners so the stress plate is tight and flush with the board surface, but do not countersink.

5. To create an air/water-resistive barrier, tape all seams, edge and end joints, and thru-wall penetrations with recommended flashing tape. Install flashing shingle-style with a minimum 4 inch overlap and follow the tape manufacturer's application instructions. Seal fastener penetrations by applying a minimum 4-inch by 4-inch piece of tape over each plate, smoothing tape edges to create an air-tight seal between the tape and the insulation board. Create continuous air/water barrier at roof and foundation wall interface using peel-and-stick membrane, or other approved barrier, following manufacturer's application instructions.
 6. Seal penetrations and panel defects with recommended sealant in accordance with the manufacturer's instructions.
 7. Repair boards damaged during installation. Patch holes less than 1 inch across with flashing tape. Patch holes greater than 1 inch across with matching board material and then seal with flashing tape.
 8. As applicable, the wall is now ready for stud cavity insulation and exterior veneer. Install approved cladding systems as soon as possible, preferably within 60 days.
- B. Foam-Plastic Wall Sheathing: Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.
1. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

END OF SECTION

SECTION 07 22 00

ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide rigid roof deck insulation, coordinated with steel deck system specified in Section 05 30 00, "Metal Decking" and Section 05 34 00, "Acoustical Metal Decking".

1.2 RELATED SECTIONS

- A. Section 05 30 00 – Metal Decking
- B. Section 07 13 26– Self-Adhering Sheet Waterproofing
- C. Section 07 62 00 – Sheet Metal Flashing and Trim
- D. Section 07 72 00 - Roof Accessories

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. ASTM C165: Test Method for Measuring Compressive Properties of Thermal Insulation Insulation
- B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
- C. ASTM C1303/C1303M - Standard Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation
- D. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics
- E. ASTM D2126 - Test Method for Response off Rigid Cellular Plastics to Thermal and Humid Aging
- F. NRCA: National Roofing Contractors Association, Chicago, IL
- G. SMACNA: Sheet Metal and Air Conditioning Contractors National Association.
- H. UL: Underwriter's Laboratories, Inc., Northbrook, IL

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, "Submittal Procedures".
- B. Product Data: Provide manufacturer's specification data sheets for each project.
- C. Provide a sample of each insulation type.
- D. Certification
 - 1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.

2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.
3. Submit certification that insulation and fastening system furnished is Tested and Approved by Factory Mutual for I-90 Wind Up-Lift Requirements.

E. Shop Drawings

1. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles. Shop drawing shall include: Outline of roof, location of drains, complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.

1.5 QUALITY ASSURANCE

- A. Provide certification that the roofing system specified in Section 07 41 13, "Metal Roof Panels", insulation, recover board, and other components shall provide a system Listed by Underwriter's Laboratories or Warnock Hersey for external fire tests of ASTM E108, Class A.
- B. Installer: Company specializing in performing the work of this Section with minimum 5 years documented experience.
- C. Manufacturer shall have produced the specified products for a period of 10 years prior to beginning work of this Section and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
- B. Store all insulation materials in manner to protect them from the wind, sun, and moisture damage prior and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.
- C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).
- D. Store materials off the ground. Any warped or broken insulation boards shall be removed from the site.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Provide insulation thickness as indicated. Where specified, provide combination of types and thicknesses to provide the specified system.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2 (20 psi),
 1. Basis of Design: Johns Manville, ENRGY 3. Website: [https://www.jm.com/content/dam/jm/global/en/commercial-](https://www.jm.com/content/dam/jm/global/en/commercial-Roofing/Data%20sheets/Insulation/RS-5137_ENRGY3rsPolyisocyanurateRoofInsulation.pdf)
 2. [Roofing/Data%20sheets/Insulation/RS-5137_ENRGY3rsPolyisocyanurateRoofInsulation.pdf](https://www.jm.com/content/dam/jm/global/en/commercial-Roofing/Data%20sheets/Insulation/RS-5137_ENRGY3rsPolyisocyanurateRoofInsulation.pdf)

- a. Contact: Dwight Stone, MBA, AIAa, CDT, Product Representative. Phone – (720) 315-6956. E-mail - Dwight.Stone@jm.com
- b. Provide insulation package with minimum R Value: minimum required by applicable code.
- c. Provide insulation package in multiple layers.
- d. Minimum Long-Term Thermal Resistance (LTTR): 5.7 per inch.
 - 1) Determined in accordance with ASTM C1303/ C1303M at 75°F (24°C)

C. Polyisocyanurate Insulation Characteristics:

1. Thickness: Approximate 5 inches total thickness, composed of layers achieving specified thermal insulation value.
2. Compression Resistance: 20 psi per ASTM D1621 at 10 percent consolidation.
3. Thermal Value: Provide minimum R-30 total LTTR assembly value.
4. Tapered Insulation: ASTM C1289, Type II, Class 1, Grade 2 (20 psi), provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated. Basis of Design: Tapered ENRGY 3.
5. Fire Rating: UL Listed and Classified as a part of a Class A listed Roof Assembly.

2.2 RELATED MATERIALS – METAL ROOF

- A. Purlin: Provide galvanized steel purlin, 16 gage, 50,000 psi minimum yield strength, galvanized to G120 coating class.
- B. Purlin Fasteners: Provide threaded mechanical fastener, fluorocarbon coated, type and size as required to comply with UL approval for anchoring purlin to metal deck.
- C. Insulation Fasteners: Provide fastener as required to comply with roof uplift listing, fluorocarbon finish, length as recommended by manufacturer to penetrate metal deck, with approved backer plate.
- D. "Z" Clip: Provide galvanized steel "Z" clip, 20 gage, galvanized to G120 coating class.
- E. Z-Clip Fasteners: Provide threaded mechanical fastener, fluorocarbon coated, length as recommended by manufacturer to penetrate metal deck.
- F. Insulation Fasteners: Basis of Design: JM Ultrafast Fasteners and Plates, length as recommended by manufacturer to penetrate metal deck, with plastic backer plate.
 1. Minimum fastening rate: 5 fasteners per board.

2.3 OTHER MATERIALS

- A. If applicable, all wood used for shims, cants, etc. shall be pressure-treated or back-primed.
- B. Provide all other materials, not specifically described but required to complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 INSPECTION OF SURFACES

- A. Contractor shall be responsible for preparing and adequate substrate to receive insulation.
 - 1. Verify that work which penetrates roof deck has been completed.
 - 2. Verify that wood nailers are properly and securely installed.
 - 3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
 - 4. Do not proceed until defects are corrected.
 - 5. Do not apply insulation until substrate is sufficiently dry.
 - 6. Broom clean substrate immediately prior to application.
 - 7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
 - 8. Verify that temporary roof has been completed.

3.2 INSTALLATION

- A. Attachment with Mechanical Fasteners
 - 1. Filler pieces of insulation require at least two fasteners per piece if size of the insulation is less than four square feet.
 - 2. Spacing pattern of fasteners shall be as per manufacturer's recommendations to meet the FM requirements for Design Criteria Wind Load on S1.1. Placement of any fastener from edge to insulation board shall be a minimum of three inches and a maximum of six inches.
 - a. Minimum fastening rate: 5 fasteners per board.
 - 3. Minimum penetration into deck shall be as recommended by the fastener manufacturer, or one inch minimum, whichever is greater.

3.3 CLEANING

- A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing system.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Weather Barrier Membrane
- B. Seam Tape
- C. Flashing

1.2 RELATED SECTIONS

- A. Section 05 41 00 – Cold-Formed Metal Framing
- B. Section 05 50 00 – Metal Fabrication
- C. Section 06 10 00 - Rough Carpentry
- D. Section 07 13 26 - Self-Adhering Sheet Waterproofing
- E. Section 07 21 00 - Thermal and Acoustical Insulation
- F. Section 07 42 13 - Metal Wall Panels
- G. Section 07 62 00 - Sheet Metal Flashing and Trim
- H. Section 07 92 00 - Joint Protection
- I. Section 09 24 00.10 - Integral Color Portland Cement Plastering

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. American Architectural Manufacturers Association (AAMA)
 - 1. AAMA 713 - Voluntary Test Method to Determine Chemical Compatibility of Sealants and Self-Adhered Flexible Flashings
 - 2. AAMA 808.3 - Voluntary Specifications and Test Methods for Sealants
- B. American Society of Testing and Materials International (ASTM)
 - 1. ASTM C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
 - 2. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
 - 3. ASTM C1193 - Standard Guide for Use of Joint Sealants
 - 4. ASTM D779 – Standard Test Method for Determining the Water Vapor Resistance of Sheet Materials in Contact with Liquid Water by the Dry Indicator Method
 - 5. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings

6. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 7. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials
 8. ASTM E96/ E96M - Standard Test Methods for Water Vapor Transmission of Materials
 9. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
 10. ASTM E1677 - Specification for Air Retarder Material or System for Framed Building Walls
 11. ASTM E1186 – Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
 12. ASTM E2112 - Standard Practice for Installation of Exterior Windows and Doors
 13. ASTM E2178 - Test Method for Air Permeance of Building Materials
 14. ASTM E2266 Standard Guide for Design and Construction of Low-Rise Frame Building Wall Systems to Resist Water Intrusion
 15. ASTM E2273 – Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
 16. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
 17. , ASTM E783 and ASTM D4541.
- C. American Association of Textile Chemists & Colorists (AATCC)
1. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test
- D. EMMA/EMMAQUA test.
- E. ICC-ES ESR-3121 – Self-Adhering Membrane
- F. NRCA (National Roofing Contractors Association) - Waterproofing Manual.
- G. Technical Association of the Pulp and Paper Industry (TAPPI)
1. TAPPI Test Method T-410 – Grammage of Paper and Paperboard (Weight per Unit Area)
 2. TAPPI Test Method T-460 - Air Resistance of Paper (Gurley Method)
- H. Underwriters Laboratory (UL) Fire Resistance Directory

1.4 SUBMITTALS

- A. Refer to Section 01 33 00, “Submittal Procedures”.
- B. Product Data: Submit manufacturer current technical literature for each component.
- C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.
- D. Quality Assurance Submittals
 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
 2. Manufacturer Instructions: Provide manufacturer’s written installation instructions.

3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

E. Closeout Submittals

1. Refer to Section 01 77 19 – "Closeout Requirements"
2. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Installer shall have 5 years of documented previous experience on at least 5 similar scope projects, using the specified or generically comparable materials.
2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
3. Comply with CBC Sections 1404.2 – 1404.4.
4. Follow recommendations of ASTM E2112 and ASTM E 2266 for general guidance in assuring a watertight building enclosure.
5. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

1.6 PRE-INSTALLATION CONFERENCE

A. Refer to Section 01 31 00, "Project Management Coordination"

B. Conduct conference at Project site in accordance with the requirements of the following:

1. Notify participants including District's Representative, Contractor, Installer, Weather Barrier Manuf. Designated Representative and District's Waterproofing Consultant, if applies, at least 7 calendar days before conducting meeting.
2. Review status of substrate work and preparation, areas of potential conflict and interface Review materials to be used and procedures to be followed in performing the Work.
3. Review availability of weather barrier assembly materials and components, installer's
4. Review training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.
5. Review in detail job conditions, schedule, construction sequence, and quality of completed installation.
6. Review installation of lathing, lath accessories, with special attention to detailing of control joints and expansion joints and acceptable repair techniques for shiners and abandoned fasteners.
7. Record discussions of conference and any conflict, incompatibility, or inadequacy. Furnish a copy of record to each participant.

C. Review all related project requirements and submittals,

1.2 DELIVERY, STORAGE AND HANDLING

- A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store weather barrier materials as recommended by weather barrier manufacturer.

1.3 MOCKUPS/TEST INSTALLATIONS

- A. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations.
 - 1. Mock-up size: 4 feet by 4 feet.
 - a. Mock-up Substrate: Match wall assembly construction, including window opening.
 - b. Mock-up may remain as part of the work.
 - 2. Contact manufacturer's designated representative prior to weather barrier assembly installation, to perform required mock-up visual inspection and analysis as required for warranty.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Provide water-resistive barrier with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10-percent of cost of materials used for the Project.
- B. LEED: For Credit MR 4.1 and MR 4.2 – Recycled Content

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.
- B. Refer to Section 01 60 00, "Product Requirements"

1.6 SEQUENCING AND SCHEDULING

- A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.
- B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.7 WARRANTY

- A. Special Warranty
 - 1. Warrant sheathing paper to be free from defects in materials and workmanship for a period of 10- years from date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the District may have against the Contractor under the Contract Documents.
 - 2. Pre-installation meetings and jobsite observations by weather barrier manufacturer for warranty is required prior to assembly installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER & MATERIALS

A. Water-Resistive Barrier (Water-Vapor Permeable) - Basis of Design:

1. Single Layer Installation:

- a. The Henry Company, Fortifiber, “Hydro Tex”, or equal.

Phone: (800) 773-4777

Website Link: www.henry.com

Product Link: <https://henry.com/fileadmin/pdf/literature/Hydro-Tex-Product-Data-Sheet-USEN-LR.pdf>

2. Substitutions per Section 01 25 00, “Substitution Procedures”.

2.2 MATERIALS – PERFORMANCE CHARACTERISTICS - AT CEMENT PLASTER SYSTEM

A. Basis of Design: Henry, “Hydro Tex”, or equal. See Specification Section 09 24 00, “Portland Cement Plaster”.

1. Reference Standard: ASTM E2273.
2. Moisture Vapor Transmission: 7.6 perms, ASTM E96 (A).
3. Water Resistance; 120 minutes, ASTM D779.
4. Drainage Efficiency: >95%, ASTM E2273

2.3 ACCESSORIES

A. Weather-Resistive Barrier Seam Tape: pressure sensitive tape as recommended by membrane manufacturer.

1. Sheathing Tape: Henry, “Sheathing Tape”, or equal.

- a. Roll Dimensions: 1-7/8” x 55 yards.
- b. Adhesive Type: Acrylic.

2. Sealant: One component, moisture curing, non-sag, gun-grade elastomeric polymer for use as a sealant or liquid applied flashing.

- a. Sealant: Henry – Moistop® Sealant.

Product Website Link: <https://henry.com/residential-and-light-commercial/sealants/moistop-sealant-and-liquid-flashing>

1) Referenced Standards: Must meet AAMA 808.3 and ASTM C920.

2) Movement Capability: ±25%; ASTM C719.

3) 4.Max VOC: 9 g/L; ASTM D3960.

4) 5.Compatibility: Chemically compatible with flexible flashing; AAMA 713.

3. Self-Adhering Flashing – Wall Penetrations, Openings and Flashings - General:

- a. Fortiflash 40 mil., or equal - <https://henry.com/residential-and-light-commercial/window-and-door-flashings/fortiflash>
4. Self-Adhering Flashing – Window and Door Openings:
 - a. Fortiflash 25 mil., or equal - <https://henry.com/residential-and-light-commercial/window-and-door-flashings/fortiflash>
5. Non-Adhering Flashing – For Use with window flashing:
 - a. Moistop PF - <https://henry.com/residential-and-light-commercial/window-and-door-flashings/moistop-pf>
6. High Temperature Rated Self-Adhering Flashing For Integrating Weather-Resistive Barrier To Wall Penetrations, Openings, and Flashings Under Sheet Metal:
 - a. Fortiflash Butyl - <https://henry.com/residential-and-light-commercial/window-and-door-flashings/fortiflash-butyl/>
7. Substitutions per Section 01 25 00, “Substitution Procedures”.
- B. **Note:** The system included in this section is expressly warranted for a period of fifteen (15) years from purchase that it will perform to Henry Company LLC (and its subsidiaries and affiliates, including Fortifiber, LLC, hereinafter collectively “Henry”) published specifications when installed according to Henry installation procedures and accepted industry standards or following installation details prepared by a properly licensed design professional. In the event of a warranty claim, Henry will pay the cost of materials and labor to correct leaks that result solely from the failure of Henry product as expressly warranted above.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.
- B. Review definition of weather-exposed surfaces from CBC Section 202: Weather-Exposed Surfaces. Surfaces of walls, ceilings, floors, roofs, soffits and similar surfaces exposed to the weather except the following:
 1. Ceilings and roof soffits enclosed by walls, fascia, bulkheads or beams that extend a minimum of 12 inches below such ceiling or roof soffits.
 2. Walls or portions of walls beneath an unenclosed roof area, where located a horizontal distance from an open exterior opening equal to at least twice the height of the opening.
 3. Ceiling and roof soffits located a minimum horizontal distance of 10 feet from the outer edges of the ceiling or roof soffits.
- C. Examine areas and substrates, with installer present, including wall assemblies, penetrations and other conditions affecting performance, and ceilings and soffits. Proceed with installation only after unsatisfactory conditions have been corrected.

- D. Inspect wall surfaces for plumb and planarity. Verify planarity of wall surface is within 1/4 inch over 10 feet or less, and within 1/8th inch over 4 feet or less. Reject non-conforming Work.
- E. Surfaces to receive water-resistive barrier shall be free from projecting nails, wires, or other conditions that might damage paper.
- F. Surfaces to be covered shall be dry and shall have dried in fair weather not less than 3-days following wetting by rain.
- G. Inspect sheathing installation. Verify continuous sheathing corners at wall openings, with no panel butt edges aligned at corners. Verify no excessive gaps occur between panel edges and panels fastening.

3.2 INSTALLATION - WEATHER BARRIER

- A. See Section 07 13 26, "Self-Adhering Sheet Waterproofing" for installation of all self-adhered flashings.
- B. Requirements for the water-resistive barrier system apply to exterior weather-exposed surfaces as defined. Non-vertical, weather-exposed building enclosure surfaces require specific materials, detailing and installation workmanship.
- C. Apply water-resistive barrier under all weather-exposed wall cladding materials. Secure to substrate to maintain in place until covered by other materials. When complete, water-resistive barrier shall be reasonably flat, without excessive warps and bulges, and free from holes, cuts, tears, and other damage and defects.
- D. Install weather barrier prior to installation of windows and doors.
- E. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
- F. Install dry-lapped weather barrier in a horizontal manner starting with 4 inch minimum horizontal overlap and 6 inch minimum (vertical) end laps, to vertical exterior wall surfaces only. At adjacent sheets courses, offset joints not less than 48 inches. At alternate sheet courses, offset joints not less than 24 inches. Begin at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level
- G. Overlap water-resistive barrier system components over vertical flanges of sheet metal drainage flashings, horizontal expansion joints, door and window sill pan and head flashings, weep screeds, drainable cement plaster lath accessories, and all other appurtenances required for a complete, integrated drainable system.
- H. Seal frames and perimeters of wall-opening assemblies such as window, door and louver assemblies, and wall penetrations such as pipes and conduits, to the water-resistive barrier system for a continuous, watertight condition to protect the building and wall assemblies from bulk water intrusion.
- I. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

J. Weather Barrier Attachment:

1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally – 12” min. penetration into structure.
2. Apply 4 inch by 7 inch piece of self adhering membrane (see Section 07 72 00) or weather barrier manufacturer approved alternate to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

- A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION (for use with non-flanged windows – all cladding types)

- A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
- B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FIELD QUALITY CONTROL

- A. Notify manufacturer’s designated representative to obtain periodic observations of weather barrier assembly installation.

3.6 PROTECTION

- A. Protect installed weather barrier from damage.

END OF SECTION

SECTION 07 26 16

BELOW-GRADE VAPOR RETARDERS

PART 1 - GENERAL

1.1. DESCRIPTION

- A. This section describes the requirements for furnishing and installing vapor retarder under concrete slabs-on-grade.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete

1.2. REFERENCES

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

1.3. SUBMITTALS

- A. Product Data: Include independent laboratory test results showing compliance with ASTM and ACI Standards. Include manufacturer's installation instructions for placement, seaming, and pipe boot installation.

1.4. PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect products against damage during field handling and installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manufacturers:
 - 1. Stego Industries Stego Wrap, 15 mil vapor barrier, Class A, (District Standard), or approved equal. Phone – (877) 464-7834. Website Link: <http://www.stegoindustries.com/products/vapor-barrier-15-mil>
 - 2. W.R. Meadows, Perminator, 15 mil vapor barrier, Phone - (800) 342-5976. Website Link - <https://www.wrmeadows.com/perminator-underslab-vapor-barrier-retarder/>
 - 3. Henry, Moistop Ultra 15, Phone: 800-773-4777. Website Link: <https://henry.com/residential-and-light-commercial/foundation-and-below-grade/moistop-ultra-15>
- B. Sealing Material: Manufacturer's sealing tape or adhesive.
- C. Pipe Boots: Manufacturer's pre-manufactured boots.
- D. Substitutions per Section 01 25 13, "Product Options".

PART 3 - EXECUTION

3.1 INSPECTION

- A. Below-grade and grading work and items penetrating vapor retarder shall be completed prior to start of installation.

3.2 INSTALLATION REQUIREMENTS

- A. Vapor Retarder Sheeting:
- B. Install in accordance with manufacturer's instructions and ASTM E1643.
- C. Unroll with the longest dimension parallel with the direction of the pour.
- D. Lap vapor retarder over footings and seal to foundation walls.
- E. Overlap joints 6-inches and seal with pressure sensitive tape.
- F. Seal penetrations, including pipes, with pipe boot.
- G. Penetrations through vapor retarder sheeting except for reinforcing steel and permanent utilities are not permitted.
- H. Repair damaged areas by cutting patches of vapor retarder sheeting, overlapping damaged area 6-inches and taping all four sides with pressure sensitive tape.

END OF SECTION

**SECTION 07 42 13
METAL WALL PANELS**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work includes, but is not necessarily limited to, furnishing and installation of all preformed metal roofing and walls, and accessories as indicated on the drawings and specified herein.
- B. Accessories including fasteners, perimeter trim and penetration treatments.

1.2 REFERENCES

A. ASTM International

1. ASTM A240; Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A653; Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
3. ASTM A666; Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
4. ASTM A792; Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
5. ASTM B209; Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
6. ASTM C612; Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
7. ASTM C645; Standard Test Method for Nonstructural Steel Framing Members.
8. ASTM D2244; Standard practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
9. ASTM D4214; Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
10. ASTM E283; Standard Test Method for determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors under Specified Pressure Differences across the Specimen.
11. ASTM E331; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
12. ASTM E1592; Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

B. German Institute for Standardization (DIN)

1. DIN EN988; Specifications for zinc and zinc alloy rolled flat products for building.
2. DIN EN1179; Zinc and Zinc alloys – Primary Zinc.

1.3 RELATED SECTIONS

A. Edit for project conditions. Section Numbers indicated are those recommended by CSI Masterformat; revise if numbers differ from those used in Project Manual.

1. Structural Steel: Section 05 12 00
2. Structural Metal Roof and Floor Decking: Section 05 30 00
3. Miscellaneous Fabricated Steel: Section 05 50 00
4. Thermal Insulation: Section 07 21 10
5. Sheetmetal Gutters and Downspouts: Section 05 50 00
6. Joint Sealants not specified herein: Section 07 92 00
7. Finish Painting not specified herein: Section 09900

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01 33 00, “Submittal Procedures”.

A. Product Data: Submit manufacturer current technical literature for each type of product.

B. Shop Drawings - Submit detailed drawings showing:

1. Profile
2. Gauge of panel
3. Location, layout and dimensions of panels
4. Location and type of fasteners
5. Shape and method of attachment of all trim
6. Locations and type of sealants
7. Installation sequence.
8. Other details as may be required for a weathertight installation

C. Samples: Provide nominal 3 x 5 inch of each color indicated Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
2. Manufacturer Erection Instructions: Provide manufacturer’s written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

D. Closeout Submittals

1. Refer to Section 01 78 00 Closeout Submittals

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to wall panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall have a minimum of ten (10) years experience in the production of metal wall panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.
- B. Manufacturer shall provide proof of \$2,000,000 liability insurance for their metal roof system and comply with current independent testing and certification as specified. See specific product
- C. Panel manufacturers without full supporting literature, Flashings & Details Guides, Guide Specifications and Technical Support shall not be considered equal to the specified product.
- D. Installer Qualifications: Installation of panels and accessories by installers with a minimum of 5 years experience on panel projects of this nature.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 01 66 00 Product Requirements

- Protect against damage and discoloration
- Handle panels with non-marring slings.
- Do not bend panels.
- Store panels above ground, with one end elevated for drainage.
- Protect panels against standing water and condensation between adjacent surfaces.
- If panels become wet, immediately separate sheets, wipe dry with clean cloth, and allow to air dry.
- Remove any strippable film coating prior to installation and do not allow it to remain on the panels in extreme cold, heat or in direct sunlight

1.8 WARRANTY

- A. Refer to Section 01 78 36 Warranties

- B. Material Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance and finish performance.

1. Warranty Period: Twenty (20) years from date Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

C. CONTRACTOR'S WARRANTY

Warrant panels, flashings, sealants, fasteners and accessories against defective materials and/or workmanship, to remain watertight and weatherproof with normal usage for two (2) years following Project Substantial Completion date.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. AEP Span, A Division of ASC Profiles Inc, 2110 Enterprise Boulevard, West Sacramento, Calif 95691 800-733-4955. Or approved equal
- B. Basis of Design: "Nu-Wave® Corrugated. Net coverage 32" (roof) or 34-2/3" (wall), rib depth 7/8" @ 2-2/3" o.c.
Basis of Design: "Nu-Wave® Corrugated. Net coverage 32" (roof) or 34-2/3" (wall), rib depth 7/8" @ 2-2/3" o.c. Perforated 13.8% Open Area .127" diameter holes at .326" o.c.
- C. Refer to Elevations for panel designation, color and properties.
- D. Substitution Limitations: per Section 01 25 13
 - 1. Submit written request for approval of substitutions to the Architect. Include the following information:
 - a. Name of the materials and description of the proposed substitute.
 - b. Drawings, cut sheets, performance and test data.
 - c. List of projects similar scope and photographs of existing installations.
 - d. Other information necessary for evaluation.
 - 2. After evaluation by Architect, approval will be issued via addendum. No verbal approval will be given.
 - 3. Substitutions following award of contract are not allowed except as stipulated in Division 01 – General Requirements.

2.2 PERFORMANCE CRITERIA

- A. Structural Performance: Provide metal wall panel systems designed to resist the following loads. Testing shall be done based on ASTM E1592:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure as indicated on Drawings.
 - 2. Deflection Limits: Metal wall panel assemblies shall withstand horizontal deflections no greater than $L/240$ of the span.
- B. Water Penetration under Static Pressure: Provide metal wall panel systems designed to resist penetration of water under static pressure. Testing shall be based on ASTM E331. Wall panels when tested shall have no water leakage at 6 pounds per square foot.

2.3 WALL PANEL MATERIALS

A. PANELS

1. Base Metal:
 - a. Material:

(1) Steel conforming to ASTM A792 Zincalume®/Galvalume®, minimum yield 50,000 psi, thickness 20 gauge
 - b. Protective Coating:

(1) Conform to ASTM A792, AZ50 (Zincalume/Galvalume).
2. Exterior Finish:
 - a. Substrate: Zincalume® Plus protective coating.
 - b. Finish: DuraTech® 5000 (Polyvinylidene Fluoride), full 70% Kynar® 500/Hylar 5000® consisting of a baked-on 0.15-0.20 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 10-30% when tested in accordance with ASTM D-523- 89 at 60°.
 - c. Color: Cool Slate Gray
3. Interior Finish:
 - a. Primer Coat Material: Corrosion-resistant primer; primer coat dry film thickness: 0.15 mils; finish coat material: polyester paint, finish coat dry film thickness: 0.35 mils.
 - b. Color: Off-White

2.4 ACCESSORIES

- A. Wall panel accessories: Provide accessories as required for a complete installation. Accessories shall be as indicated on approved shop drawings and per manufacturer's approved standard details. Match material and finish of metal wall panels.
 1. Closure Strips:
 - a. Closed Cell Closure Strips: Provide minimum 1 inch thick matching metal wall panel profile. (Where required)
 - b. Metal Profile Closure Strips: Shall be fabricated from same gauge, material and finish as metal panel.
- B. Trim:
 1. Fabricate trim from same material and material thickness as wall panels. Finish to match metal wall panels.
 2. Locations include, but are not limited to the following: Drips, sills, jambs, corners, framed openings, parapet caps, reveals and fillers.
 3. Trim shall be provided under Section 07 62 00 - Sheet Metal Flashing and Trim”.
- C. Metal Framing:
 1. General: All exposed exterior metal framing to be ASTM A653, G90 hot-dip galvanized
 2. Hat-Shaped, Rigid Furring Channels:
 - a. Gauge: [16 gauge

- b. Depth: [7/8"]
- 3. Cold-Rolled Furring Channels: Minimum 1/2-inch wide flange.
 - a. Gauge: 16 gauge.
 - b. Depth: As indicated on Drawings.
- D. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

2.5 FABRICATION

- A. Metal wall panels shall be formed to lap and interconnect with edges of adjacent panels which are then mechanically attached through panel to supports using concealed fasteners.
- B. Panels shall be factory formed. Field formed panels are not acceptable.
- C. Trim Accessories: Fabricate steel trim accessories to comply with recommendations outlined in SMACNA's "Architectural Sheet Metal Manual"
- D. Trim Accessories: Provide manufacturer's standard extruded trim.
 - 1.

2.6 FINISHES

- A. Steel
 - 1. Finish and Color:
 - a. Color: See drawings.
 - b. Finish System: DuraTech® 5000 (Polyvinylidene Fluoride), full 70% Kynar® 500/Hylar 5000® consisting of a baked-on 0.15-0.20 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 10-30% when tested in accordance with ASTM D-523- 89 at 60°

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Provide field measurements to manufacturer as required to achieve proper fit of the metal wall panels to building envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.
- B. Supporting Steel: All structural supports required for installation of panels shall be by others. Support members shall be installed within the following tolerances:
 - 1. Plus or minus 1/8 inch in 5 feet in any direction along plane of framing.
 - 2. Plus or minus 1/4 inch cumulative in 20 feet in any direction along plane of framing.
 - 3. Plus or minus 1/2 inch from framing plane on any elevation.
 - 4. Plumb or level within 1/8 inch at all changes of transverse for performed corner panel applications.

5. Verify that bearing support has been provided behind vertical joints of horizontal panel systems and vertical joints of horizontal panel systems. Width of support shall be as recommended by manufacturer.

- C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

3.2 PANEL INSTALLATION

Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

- A. Install panels plumb, level, and true-to-line to dimensions and layout indicated on approved shop drawings.
- B. Cutting and fitting of panels shall be neat, square and true. Torch cutting is prohibited.

3.3 TRIM INSTALLATION

- A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.
- B. Apply sealant tape at trim, per manufacturer's details and approved shop drawings, for weathertight installation.

3.4 SEALANT INSTALLATION FOR EXPOSED JOINTS

- A. Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations.
- B. Follow sealant manufacturer's recommendations for joint width-to-depth ratio, application temperature range, size and type of backer rod, and compatibility of materials for adhesion.

3.5 CLEANING AND PROTECTION

- A. Remove protective film immediately after installation.
- B. Touch-up, repair or replace metal panels and trim that have been damaged.
- C. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION

SECTION 07 42 13.16
METAL PLATE WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work includes, but is not necessarily limited to, furnishing and installation of all metal wall panels and accessories as indicated on the drawings and specified herein.

1.2 related sections

- A. Thermal Insulation: Section 07 21 00
- B. Flashing and Sheetmetal: Section 07 62 00
- C. Joint Protection not specified herein: Section 07 92 00
- D. Finish Painting not specified herein: Section 09 91 00

1.3 REFERENCES

- A. ASTM A 653 - Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
- B. ASTM A 924 - General Requirements for Steel Sheet, Zinc Coated by the Hot Dip Process.
- C. FS QQ-Z-100 - Zinc Alloy.
- D. SMACNA - Architectural Sheet Metal Manual, 1993 edition.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Describe material profile, jointing pattern, jointing details, fastening methods, and installation details.

1.5 QUALITY ASSURANCE

- A. Fabricator: Company specializing in sheet metal work with 5 years minimum experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products under provisions of Section 01 66 00.
- B. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation.

- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.7 GUARANTEE

A. Contractor's Guarantee:

1. Provide guarantee against the following defects for a time period of three years, commencing from the date of final acceptance of the project.
 - a. Water intrusion through flashing joints into building interior.
2. Make inspections and emergency repairs to defects or leaks in system within twenty-four (24) hours of receipt of notice from the Owner.
3. Restore the affected areas to the standard of the original specifications as soon as weather permits.

PART 2 - PRODUCTS

2.1 panel MATERIALS

A. Stainless Steel (SS-1):

1. Classification: Per ASTM A276, ASTM A479, AMS 5639.
2. Finish: 304/304L Stainless Steel
3. Gage: 22

2.2 ACCESSORIES

- A. Fasteners: As detailed in drawings. Finish exposed fasteners same as panel metal.
- B. Sealant: Type specified in Section 07 92 00.
- C. Flashing Cement: As specified in Section 07 54 19.
- D. Provide water resistant underlayment per Section 09 21 16.
- E. Provide elastomeric flashing per Section 07 13 26.

2.3 Prefabricated Components

A. Prefabricated Reglet Assembly:

1. Manufacturer and Series: Fry, www.fryreglet.com or equal, Type as required for condition shown on drawings.
 - a. For purpose of establishing required level of quality, characteristics of products manufactured by Fry are specified.

2.4 formed components

- A. Provide metal work as shown on Drawings. Where specific details are not shown, fabricate according to applicable SMACNA "Architectural Sheet Metal Manual" criteria.
- B. Form sections true to shape, accurate in size, square, and free from distortion or defects. Match profiles at connections. Provide ribs, cleats, and reinforcement necessary to make sections rigid and substantial. Allow for expansion and contraction.

2.5 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3. In the event of discrepancy, immediately notify the Architect.
 - 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

- A. Field measure site conditions prior to fabricating work.

3.3 Installation

- A. Support all panels with firm and stable attachments, anchored into solid backing as required.
- B. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- C. Install to form tight fit. Secure in place in accordance with construction documents.

END OF SECTION

SECTION 07 54 19
POLYVINYL CHLORIDE (PVC) MEMBRANE ROOFING

1. SECTION INCLUDES
 - a. Mechanically fastened PVC membrane roofing system.
 - b. Cover board.
 - c. Roof insulation.

2. RELATED SECTIONS
 - a. Division 05 Section "Steel Decking" for steel roof deck.
 - b. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, cants, curbs, and blocking].
 - c. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counter flashings.
 - d. Division 22 Section "Storm Drainage Piping Specialties" for roof drains.

3. REFERENCES
 - a. Roofing Terminology: Refer to the following publications for definitions of roofing work related terms in this Section:
 - 1) ASTM D 1079 "Standard Terminology Relating to Roofing and Waterproofing."
 - 2) Glossary of NRCA's "The NRCA Roofing and Waterproofing Manual."
 - 3) Roof Consultants Institute "Glossary of Building Envelope Terms."
 - b. Sheet Metal Terminology and Techniques: SMACNA "Architectural Sheet Metal Manual."

4. DESIGN CRITERIA
 - a. General: Installed roofing membrane system shall remain watertight; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.
 - b. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

- c. Installer shall comply with current code requirements based on authority having jurisdiction.
- d. Wind Uplift Performance: Roofing system shall be identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE 7.
- e. California Title 24/CRRC-1: Roofing system shall comply with the requirements of Title 24 and shall be tested by CRRC-1.
- f. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1) Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

5. SUBMITTALS

- a. Product Data: Manufacturer's data sheets for each product to be provided.
- b. Detail Drawings: Provide roofing system plans, elevations, sections, details, and details of attachment to other Work, including:
 - 1) Base flashings and membrane terminations.
 - 2) Tapered insulation, including slopes.
 - 3) Crickets, saddles, and tapered edge strips, including slopes.
 - 4) Insulation fastening and adhesive patterns.
- c. Verification Samples: Provide for each product specified.
- d. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- e. Maintenance Data: Refer to Johns Manville's latest published documents on www.JM.com.
- f. Guarantees: Provide manufacturer's current guarantee specimen.
- g. Prior to beginning the work of this section, roofing sub-contractor shall provide a copy of the final System Assembly Letter issued by Johns Manville Roofing Systems indicating that the products and system to be installed shall be eligible to receive the specified manufacturer's guarantee when installed by a certified JM contractor in accordance with our application requirements, inspected and approved by a JM Technical Representative.

- h. Prior to roofing system installation, roofing sub-contractor shall provide a copy of the Guarantee Application Confirmation document issued by Johns Manville Roofing Systems indicating that the project has been reviewed for eligibility to receive the specified guarantee and registered.

6. QUALITY ASSURANCE

- a. **Installer Qualifications:** Qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive the specified manufacturer's guarantee.
- b. **Manufacturer Qualifications:** Qualified manufacturer that has UL listing for roofing system identical to that used for this Project.
- c. **Testing Agency Qualifications:** An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 329.
- d. **Test Reports:**
 - 1) Roof drain and leader test or submit plumber's verification.
- e. **Source Limitations:** Obtain all components from the single source roofing manufacturer guaranteeing the roofing system. All products used in the system shall be labeled by the single source roofing manufacturer issuing the guarantee.

7. DELIVERY, STORAGE, AND HANDLING

- a. Deliver roofing materials in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
- b. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
- c. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- d. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

8. PROJECT CONDITIONS

- a. **Weather Limitations:** Proceed with installation only when current and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and guarantee requirements.

9. GUARANTEE

- a. Provide manufacturer's system guarantee equal to Johns Manville's Peak Advantage No Dollar Limit Roofing System Guarantee.
 - 1) Single-source special guarantee includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover board, walkway products, manufacturer's edge metal products, and other single-source components of roofing system marketed by the manufacturer.
 - 2) Guarantee Period: 20 years from date of Substantial Completion.
 - 3) Contractor is required to list "JK Architecture" as the Specifier/Consultant of record in the appropriate fields ("Specifier Account") when applying for the manufacturer's warranty.
- b. Installer's Guarantee: Submit roofing Installer's guarantee, including all components of roofing system for the following guarantee period:
 - 1) Guarantee Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

1. POLYVINYL-CHLORIDE ROOFING MEMBRANE - PVC

- a. PVC Sheet: ASTM D 4434, Type III, fabric reinforced [that contains KEE (Elvaloy) to reduce plasticizer migration]. Basis of design: [JM PVC]
 - 1) Thickness: 60 mils (1.52 mm), nominal
 - a) Alternate: 80 mils (2.03 mm), nominal.
 - 2) Exposed Face Color: White
 - 3) Substitutions to be considered per 01-25-13

2. AUXILIARY ROOFING MATERIALS – SINGLE PLY

- a. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
 - 1) Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

- b. Sheet Flashing: Manufacturer's internally reinforced or scrim reinforced, smooth backed membrane with same thickness and color as sheet membrane. Basis of design: JM PVC
- c. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for base flashings. Basis of design: JM PVC Membrane Adhesive (Low VOC)
- d. Slip Sheet – Recommended for future PV system: Minimum 9.0 oz/yd² needle punched, UV-resistant polyester fabric slip sheet, as required for application. Basis of design: JM Polyester Mat Protection Slipsheet
- e. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, with anchors. Basis of design: JM Termination Systems
- f. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer. Basis of design: High Load Fasteners and Plates
- g. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, cover strips, sealants, and other accessories. Basis of design: JM PVC Pourable Sealer, JM PVC Pipe Boots, PVC Split Pipe Boot, PVC Square Pipe Boot, JM PVC Penetration Pan, JM PVC Universal Corners, JM PVC T-Joint Patch, JM PVC Membrane Cleaner (Low VOC), JM PVC-Coated Metal, JM PVC Edge Sealant, JM PVC Profile, JM PVC Detail Strip, JM PVC Detail Membrane and JM Single Ply Caulk

3. WALKWAYS

- a. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer. Basis of design: JM PVC Walkpad

4. COVER BOARD

- a. Gypsum Fiber Board: ASTM C 1278, non-faced, gypsum and cellulose fiber substrate, 1/2 inch (13 mm) thick. Basis of design: Securock Gypsum-Fiber Roof Board

5. ROOF INSULATION

- a. General: Preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- b. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 (20 psi), Basis of design: [ENRGY 3
 - 1) Provide insulation package with minimum R Value: minimum required by applicable code.

- 2) Provide insulation package in multiple layers.
- 3) Minimum Long-Term Thermal Resistance (LTTR): 5.7 per inch.
 - a) Determined in accordance with CAN/ULC S770 at 75°F (24°C)

6. TAPERED INSULATION

- a. Tapered Insulation: ASTM C 1289, Type II, Class [1], Grade [2 (20 psi)], provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated. Basis of design: [Tapered ENRGY 3

7. INSULATION ACCESSORIES

- a. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- b. Provide factory preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated. Basis of design: Diamondback Pre-Cut Cricket, Diamondback Pre-Cut Miter, or Tapered Fesco Edge Strip
- c. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and furnished by roofing system manufacturer. Basis of design: UltraFast Fasteners and Plates and High Load fasteners and plates.
- d. Wood Nailer Strips: Comply with requirements in Division 06 Section "Miscellaneous Rough Carpentry."

8. EDGE METAL COMPONENTS

- a. Expansion Joints: Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a bifurcation process. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: [Expand-O-Flash] [Expand-O-Gard]
- b. Coping System: Manufacturer's factory fabricated coping consisting of a base piece and a snap-on cap. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: Presto-Lock Coping
 - 1) Coping Finish Kynar 500 factory finish. Color selection by Architect
- c. Metal Edge System: Manufacturer's factory fabricated metal edge system used to terminate the roof at the perimeter of the structure. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: [Presto-Weld Drip Edge] [JM PVC-Coated Metal]

- d. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Sheet Metal Flashing and Trim."

PART 3 - EXECUTION

1. EXAMINATION

- a. Examine substrates, areas, and conditions for compliance with the requirements affecting performance of roofing system.
 - 1) General:
 - a) Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - b) Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 2) Steel Decks:
 - a) Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
 - 3) Ensure general rigidity and proper slope for drainage.
 - 4) Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
- b. Unacceptable panels should be brought to the attention of the General Contractor and Project Owner's Representative and shall be corrected prior to installation of roofing system.
- c. Proceed with installation only after unsatisfactory conditions have been corrected.

2. PREPARATION

- a. Clean and remove from substrate sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.
- b. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.
- c. If applicable, prime surface of deck with asphalt primer at a rate recommended by roofing manufacturer and allow primer to dry.

- d. Proceed with installation only after unsatisfactory conditions have been corrected.

3. SLIP SHEET INSTALLATION – FOR FUTURE PV SYSTEM

- a. Install polyester slip sheet as a loosely laid single layer beneath single ply membrane, side and end lapping each sheet a minimum of 3 inches (76.2 mm) and 6 inches (150 mm), respectively. Sheet may be tacked into place as deemed necessary.
- b. Comply with roofing system manufacturer's written instructions for installing roof slip sheet.
- c. Proceed with installation only after unsatisfactory conditions have been corrected.

4. INSULATION INSTALLATION

- a. Coordinate installation of roof system components so insulation and cover board are not exposed to precipitation or left exposed at the end of the workday.
- b. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.
- c. Install tapered insulation under area of roofing to conform to slopes indicated.
- d. Install insulation boards with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch (6 mm) with like material.
- e. Install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- f. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- g. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- h. Preliminarily Fastened Insulation [for Mechanically Fastened Membrane Systems]: Install insulation with fasteners at rate required by roofing system manufacturer or applicable authority, whichever is more stringent.
 - 1) Fasten top layer to resist uplift pressure at corners, perimeter, and field of roof.
- i. Proceed with installation only after unsatisfactory conditions have been corrected.

5. COVER BOARD INSTALLATION

- a. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.

- b. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.
- c. Install cover board with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch (6 mm) with cover board.
 - 1) Cut and fit cover board within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- d. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 - 1) Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- e. Preliminarily Fastened Insulation for Mechanically Fastened Systems: Install cover board with fasteners at rate required by roofing system manufacturer or applicable authority, whichever is more stringent.
- f. Proceed with installation only after unsatisfactory conditions have been corrected.

6. ROOFING MEMBRANE INSTALLATION, GENERAL

- a. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.
- b. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
- c. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.
 - 1) Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.
 - 2) Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3) Remove and discard temporary seals before beginning work on adjoining roofing.
- d. Proceed with installation only after unsatisfactory conditions have been corrected.

7. MECHANICALLY FASTENED ROOFING MEMBRANE INSTALLATION

- a. Install roofing membrane over area to receive roofing in accordance with roofing system manufacturer's written instructions.

- 1) Unroll roofing membrane and allow it to relax before installing.
- 2) Install sheet in accordance with roofing system manufacturer's written instructions.
- b. Accurately align roofing membranes and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- c. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- d. Always install membrane laps perpendicular to the steel deck flutes. "Picture Frame" installation method is not permitted.
- e. Apply roofing membrane with side laps shingled with roof slope, where possible.
- f. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1) Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
 - 2) Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - a) Remove and repair any unsatisfactory sections before proceeding with Work.
 - 3) Repair tears, voids, and lapped seams in roofing membrane that do not meet requirements.
- g. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
- h. In-Splice Attachment: Secure one edge of roofing membrane using fastening plates or metal battens centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field-splice seam.
- i. Install roofing membrane and auxiliary materials to tie into existing roofing.
- j. Proceed with installation only after unsatisfactory conditions have been corrected.

8. BASE FLASHING INSTALLATION

- a. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- b. Apply solvent-based bonding adhesive at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

- c. Flash penetrations and field-formed inside and outside corners per manufacturer's installation instructions.
- d. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- e. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
- f. Proceed with installation only after unsatisfactory conditions have been corrected.

9. WALKWAY INSTALLATION

- a. Flexible Walkways: Install walkway products in locations indicated. Heat weld and adhere walkway products to substrate according to roofing system manufacturer's written instructions.
- b. Proceed with installation only after unsatisfactory conditions have been corrected.

10. FIELD QUALITY CONTROL

- a. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- b. Final Roof Inspection: Arrange for roofing system manufacturer's Registered Roof Observer (RRO) to inspect roofing installation on completion and submit report to Architect.
 - 1) Notify Architect or Owner 48 hours in advance of date and time of inspection.
- c. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- d. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

11. PROTECTION AND CLEANING

- a. Protect roofing system from damage and wear during remainder of construction period.
- b. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- c. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Coping, parapet, and cap flashings, where not provided under

Note: This project requires the installation of a specific coping type at the single-ply roofing in order to maintain a 30 year warranty for the roofing – coordinate with work in that section.

- B. Reglets and counter-flashings.
- C. Metal Edge Banding – District Standard custom finish.
- D. Closure panels at edges of roof (above roof decking), as indicated in Drawings.
- E. Steel pipe downspouts shall be provided under Section 05 50 00, “Metal Fabrications” – coordinate associated work with that section.
- F. Sill and head flashings for openings.
- G. Misc. other sheet metal flashings and trims not specifically described above – coordinate with work provide in sections listed in Section 1.2 “Related Sections”.

1.2. RELATED SECTIONS:

- A. Section 03 30 00 - Cast-In-Place Concrete.
- B. Section 05 12 00 - Structural Steel
- C. Section 05 12 13 - Architecturally Exposed Structural Steel
- D. Section 05 30 00 - Metal Decking
- E. Section 05 40 00 - Cold-Formed Metal Framing
- F. Section 05 50 00 - Metal Fabrications
- G. Section 06 10 00 - Rough Carpentry
- H. Section 07 13 26 - Self-Adhering Sheet Waterproofing
- I. Section 07 21 00 - Thermal and Acoustical Insulation
- J. Section 07 22 00 - Roof and Deck Insulation

- K. Section 07 25 00 - Weather Barriers
- L. Section 07 42 13- Formed Metal Wall Panels
- M. Section 07 54 19 - Polyvinyl-Chloride Membrane Roofing – Coordination with coping for single ply roofing required – specific coping is required for 30-year roofing warranty.
- N. Section 07 72 00 - Roof Accessories
- O. Section 07 92 00 - Joint Sealants
- P. Section 08 11 13 - Hollow Metal Doors and Frames
- Q. Section 08 31 13 - Access Doors and Frames
- R. Section 08 41 13 - Aluminum Storefronts, Entrances & Windows
- S. Section 08 62 00 - Unit Skylights
- G. Section 09 21 16 - Gypsum Board & Cementitious Backerboard
- H. Division 22 – Coordination with Plumbing Items.
- I. Division 24 – Coordination with Mechanical Items
- J. Divisions 26 – 28 – Coordination with Electrical Items.
- K. Coordination with other sections not listed may be required.

1.3. REFERENCES

- A. ANSI SPRI ED-1 – Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- B. ASTM B32 - Standard Specification for Solder Metal
- C. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- D. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- F. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- G. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free
- H. FS O-F-506 – Federal Specification: Flux Soldering: Past and Liquid.
- I. NRCA (National Roofing Contractors Association)-Roofing Manual.

J. SMACNA - Architectural Sheet Metal Manual.

1.4. SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00, "Submittal Requirements".
- B. Describe material profile, jointing pattern, jointing details, fastening methods, and installation details.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00, "Submittal Requirements".

1.5. QUALITY ASSURANCE

- A. Fabricator: Company specializing in sheet metal flashing work with 5 years minimum experience.

1.6. DELIVERY, STORAGE, AND HANDLING

- A. Store products under provisions of Section 01 50 00, "Temporary Facilities and Controls".
- B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation.
- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.7. MOCKUPS/TEST INSTALLATIONS

- A. Provide mockups for Architect's review and approval of critical transitions (corners, edge conditions, etc.)
- B. Provide mockups of all profiles listed in drawing for Architect's approval for size, gauge, and color.
- C. Mockups may be included in final work.

1.8. WARRANTY

- A. Contractor's Guarantee:
 - 1. Provide Owner with written Guarantee on Contractor's letterhead and signed by General Contractor and flashing system subcontractor.
 - 2. Provide guarantee against the following defects for a time period of three years, commencing from the date of final acceptance of the project.
 - 3. Flashing blow-off or permanent deformation from wind.

4. Water intrusion through flashing joints into building interior.
5. Make inspections and emergency repairs to defects or leaks in the roof system within twenty-four (24) hours of receipt of notice from the Owner.
6. Restore the affected areas to the standard of the original specifications as soon as weather permits.

PART 2 - PRODUCTS

2.1. SHEET MATERIALS

- A. Galvanized Steel:
 1. Classification: Per ASTM A653/A653M and A924/A924M.
- B. Finish: Hot Dip galvanized, G90 coating. See Section 09 91 00, "Painting - Interior and Exterior" for preparation, primers and finishes related to galvanized sheet metal.
- A. Gauge As specified and shown on drawings. If not shown on drawings, provide minimum 22 gauge.
- C. Coordinate work with downspouts provided under Section 05 50 00, "Metal Fabrications", including straps, fasteners, etc. required for full installation of downspouts.
- D. Manufacture and install copings, roof edge flashings, etc. tested according to ANSI/SPRI ES-1 and capable of resisting the established design pressure.

2.2. ACCESSORIES

- A. Fasteners: Galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.
- B. Sealant: Type specified in Section 07 92 00, "Joint Protection".
- C. Self-Adhered Membranes, Flexible Membrane Flashing, and Flashing Cement: As specified in 07 13 26, "Self-Adhering Sheet Waterproofing".
- D. Solder: ASTM B 32; type with less than 0.2% lead.
- E. Flux: FS O-F-506.
- F. Provide water resistant underlayment per Section 07 13 26, "Self-Adhering Sheet Waterproofing".
- G. Provide elastomeric flashing per Section 07 13 26, "Self-Adhering Sheet Waterproofing".
- H. Prefabricated Components
 1. Prefabricated Reglet Assembly:

2. Manufacturer and Series: Fry, www.fryreglet.com , or equal, Type as required for condition shown on drawings.
 3. For purpose of establishing required level of quality, characteristics of products manufactured by Fry are specified.
- I. Counter-Flashing: Galvanized Steel, with wind-locks at 32 inches on center and at each corner. Provide prefinished counter-flashing where adjacent to prefinished metal roofing or siding
- J. Corners: Provide factory prefabricated corner assemblies.
- K. Through Wall Flashing: Provide factory prefabricated Manufactured through-wall flashing
- L. Components
1. Provide sheet metal work as shown on Drawings and not specified under other Sections. Fabricate as indicated. Where specific details are not shown, fabricate according to applicable SMACNA "Architectural Sheet Metal Manual" criteria.
 2. Form sections true to shape, accurate in size, square, and free from distortion or defects. Match profiles at connections. Provide ribs, cleats, and reinforcement necessary to make sections rigid and substantial. Allow for expansion and contraction.
 3. Unless noted otherwise, fabricate cleats and starter strips of same material as sheet, minimum 2 inches wide, interlocked with fabrication.
 4. Form pieces in longest practical lengths. Locate joints of fasciae, roof edges, and other sheet metal work exposed to view with respect to panel joints or other architectural features as indicated on Drawings, or as directed by Architect.
 5. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip and cleat interlock.
 6. Generally, provide shop joints single locked and soldered, or lapped, riveted and soldered. Provide field joints designed to permit expansion, with joint covers or lapped joints with "S" clips. Do not solder.
 7. Provide lapped, riveted and soldered joints at gutter conditions.
 8. Provide all concealed stiffeners and bracing at roof edge trim, fascia and gutter cover as required by Architect.
 9. Provide 10 gage x 1-1/2 inch wide gutter bracket support, wrapping completely around gutter, located at 32 inches on center and fastened to solid blocking with 2 No. 12 wood screws. Provide 16 gage x 1-1/2 inch gutter strap at 32 inches on center, extending minimum 6 inches under roofing system.
 10. Provide gutter flashing in compliance with SMACNA Chapter 1, including "rectangular Gutter Design criteria" page 1.8, 5th edition. Provide fully welded two, three and four way gutter intersections, with expansion joints fabricated and located per Figure 1-5 and 1-6.

11. Form material with flat lock seams unless noted otherwise. Overlap seams in direction of flow with finished width of lock seams and soldered lap seams not less than 1 inches, and finished width of unsoldered lap seams not less than 3 inches.
12. Where specified, solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Provide smooth even surface on exposed soldering on finished surfaces.
13. Provide shop formed transition and corner pieces with locked and soldered corners. Locate field joints not less than one foot nor more than three feet from actual corner. Shortest length dimension of any corner piece leg shall not be less than one foot.
14. Locate parapet coping expansion joints 20 feet on center maximum, and as otherwise required to permit expansion and contraction.
15. Fabricate flashing assemblies as specified in this Section and as shown on Drawings.

2.3. FINISH

- A. Paint flashing applications as specified below in off-site shop location.

2.4. OTHER \ MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

- A. Inspection:
 1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 3. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
 4. Verify roof membrane, elastomeric flashing, waterproof underlayment and base flashings are in place, sealed, and secure.
 5. In the event of discrepancy, immediately notify the Architect.
 6. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

B. Preparation

1. Field measure site conditions prior to fabricating work.
2. Install starter and edge strips, and cleats before starting installation.
3. Except at prefinished material specified in Section 07 41 13, "Metal Roof Panels", pre-paint all copings, gutters, expansion joint flashings, counter-flashings and related flashing assemblies when visible from any location in final project. Pre-paint in off-site shop location, complying with paint system specified in Section 09 91 00, "Painting - Interior and Exterior". Touch up after installation.
4. Installation
5. Support all flashings with firm and stable attachments, anchored into solid backing as required.
6. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
7. Where required by installation, solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
8. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.
9. Insert flashings into reglets to form tight fit. Secure in place in accordance with the manufacturer's instructions.
10. Coping Installation:
 - a. Install coping with cleats and clips as specified and as shown on drawings. Provide continuous cleat at exterior surface. Provide approved fasteners at inside (roof) surface at 24 inches on center.
 - b. Install coping intermediate joints per Schedule, Article 3.4 of this Section. Locate as shoe.
 - c. Provide waterproof underlayment over wall framing and under coping flashing. Provide elastomeric flashing at all coping joints, extending 12 inches each side of joint. Coordinate with plaster underlayment installation.
11. Gutter, Scupper, And Downspout Installation:
 - a. Secure gutters and covers and downspouts in place as detailed.
12. Coordinate with waterproof membrane underlayment installation as specified in Section 07 13 00.
13. Connect downspouts to downspout boots and seal connection.

C. Roof Membrane Flashing:

1. Provide and install in coordination with roofing work, all flashing, counter-flashing, sleeves, and related components as required to provide a watertight installation.
2. Set sheet metal installed on or adjoining roofing in continuous bed of approved roofing cement.
3. Aluminum Components Installation:
4. Provide di-electric separation at all components, including fasteners.
5. Provide expansion sleeves at end of radiused components. Do not splice at mid-point of radius.
6. Attach coping with welded connections, mechanical fasteners, clips, and brackets. Do not solder.

D. Fabrication Schedule:

1. Coping:
2. Material and Gauge: Galvanized Steel:
3. Flashing with an exposed vertical face of 8" or less: 24 gauge.
4. Flashing with an exposed vertical face of 8" to 10": 22 gauge.
5. Flashing with an exposed vertical face of 10" to 15": 20 gauge.
6. Finish: As specified in this Section.
7. SMACNA Reference: Table 3-1, with J9 drive cleat, flat lock seam joint design, C1 corner, and E1 edge.
 - a. Prefabricated and Fabricated Reglet Counterflashing:
8. Material and Gauge: Galvanized steel, 22 gauge, painted.
9. Finish: As specified in this Section, painted.
10. Miscellaneous flashing, roof flashing, metal flashing assemblies and counterflashing:
11. Material and Gauge: Galvanized Steel:
12. Flashing with an exposed vertical face of 8" or less: 24 gauge.
 - a. Flashing with an exposed vertical face of 8" to 10": 22 gauge.
13. Flashing with an exposed vertical face of 10" to 15": 20 gauge.
14. Finish: As specified in this Section, painted
15. Gutters:
 - a. Material and Gauge: Galvanized steel, 22 gauge.
 - b. Finish: As specified in this Section, painted.
 - c. SMACNA Reference: Concealed Hanging Gutters, Figure 1-15C, with minimum 4 inch flashing flange beneath roof flashing system
 - d. Provide downspout connection per SMACNA Figure 1-33, with basket strainer.
16. Steel Pipe Downspout:
 - a. Material and Gauge: ASTM A 53, Grade B, Schedule 40, galvanized, unless otherwise shown or specified.
 - b. Finish: Painted per Section 09 91 00, "Painting - Interior and Exterior".

- c. Transition at plaster finished wall intersecting adjacent plaster wall: Provide 22 gage fully soldered fabricated transition. Fabricate transition to extend beneath plaster finish at all surfaces 4 inches. Coordinate transition with coping and underlayment as directed by Architect.

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Equipment Supports.
 - 2. Roof Hatches.
 - 3. Guards.
 - 4. Roof Tie-Offs.

1.2 RELATED SECTIONS:

- A. Section 05 12 00 - Structural Steel
- B. Section 05 30 00 - Metal Decking
- C. Section 05 34 00 - Acoustical Metal Decking
- D. Section 05 50 00 - Metal Fabrications
- E. Section 06 10 00 - Rough Carpentry.
- F. Section 07 13 26 - Self-Adhering Sheet Waterproofing
- G. Section 07 21 00 - Thermal and Acoustical Insulation
- H. Section 07 22 00 - Roof Deck Insulation
- I. Section 07 25 00 – Weather Barriers
- J. Section 07 54 19 - Polyvinyl Chloride (PVC) Roofing
- K. Section 07 62 00 - Sheet Metal Flashing and Trim
- L. Section 07 92 00 - Joint Protection
- M. Division 24 – Coordination with Mechanical Items.
- N. Coordination with other sections not listed may be required.

1.2 REFERENCES (Current Edition for All Standards Listed)

- A. AAMA 2603 – Kynar Paint Standards
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel
- C. ANSI A10.32-12 - Personal Fall Protection Used in Construction and Demolition Operations
- D. ANSI Z359.18-17 – Safety Requirements for Anchorage Connectors.

- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- G. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- J. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
- K. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coating
- L. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- M. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- N. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board
- O. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
- P. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
- Q. ASTM C1311 - Standard Specification for Solvent Release Sealants
- R. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
- S. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
- T. OSHA 1910 – General Industry Regulations
- U. OSHA 1926 Subpart M - Safety and Health Regulations for Construction
- V. Underlayment:

1.3 SUBMITTALS

- A. Product Data: For each type of roof accessory.
- B. Shop Drawings: For roof accessories.
- C. Closeout submittals.
 - 1. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Manufacturer: A minimum of 5 years experience manufacturing similar products.
- B. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-ventilated area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.6 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium; not less than 1-1/2 inches thick.

1.7 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.
- A. Warranty: Submit executed copy of manufacturer's standard warranty under the provisions of Section 01 77 00 – "Closeout Requirements"
- B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOF HATCHES

- A. Basis-of-Design Manufacturer:
The BILCO Company, P.O. Box 1203, New Haven, CT 06505
Phone: (800) 366-6530, Website: www.bilco.com
- B. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.

The roof hatch shall be pre-assembled from the manufacturer.
- C. All products this Section – Substitutions per Section 01 25 13, "Substitution Procedures".
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide:

- a. The BILCO Company - <https://www.bilco.com>. Phone: (800) 366-6530.
- b. Local Representative Contact: Arvin Mendoza, Collier Building Specialties, Phone - (415) 467-9235. E-mail – arvin@colliersf.com

Type E-50TB Ladder Access Roof Hatch or approved equal

- a) Type and Size: Single-leaf lid, 36 by 36 inches.
- b) Product Website Link: <https://www.bilco.com/ProductDetail/Type-E-Roof-Hatch-Ladder-Access-21>

D. Performance characteristics:

1. Cover and curb shall be thermally broken to prevent heat transfer between interior and exterior surfaces.
2. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m²) with a maximum deflection of 1/150th of the span or wind uplift per CBC and ASCE 7-10.
3. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
4. Operation of the cover shall not be affected by temperature.
5. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.

6. Hatch Material – Type F Roof Hatch:
 - a. Zinc-coated (galvanized) steel sheet.
 - b. Thickness: Manufacturer's standard thickness for hatch size indicated 0.079 inch.
 - c. Finish: Baked enamel or powder coat.
 - d. Color: As selected by Architect from manufacturer's full range.
 - e. Construction:
 - 1) Insulation:
 - a) 1-inch- thick, glass-fiber board.
 - b) R-Value: 2.78 according to ASTM C1363.
 - f. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
 - g. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
 - h. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
 - i. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 - j. Fabricate curbs to minimum height of 18 inches above roofing surface unless otherwise indicated (Note: non-standard height to allow for insulation thickness and 8” min. upturn at roofing material – required).
 - k. All curbs supporting roof hatches, where the top is required to remain level, shall be 18” min. high at the high side with a sloped base to match roof slope.

7. Hatch Material – E-50TB Roof Hatch:
 - a. Cover: Shall be 11 gauge (2.3mm) aluminum with a 5” (127mm) beaded flange with formed reinforcing members. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
 - b. Cover insulation: Shall be 3” (75mm) thick polyisocyanurate with an R-value = 18 (U=0.315 W/m²K), fully covered and protected by an 18 gauge (1mm) aluminum liner.
 - c. Curb: Shall be 18” (305mm) in height and of 11 gauge (2.3mm) aluminum. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. The curb shall be formed with a 5-1/2” (140mm) flange with 7/16” (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6” (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
- A. Lifting Mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.
- B. Hardware
 1. Heavy stainless steel pintle hinges shall be provided
 2. Cover shall be equipped with a spring latch with interior and exterior turn handles
 3. Roof hatch shall be equipped with interior and exterior padlock hasps.
 4. The latch strike shall be a stamped component bolted to the curb assembly.
 5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1” (25mm) diameter red vinyl grip handle to permit easy release for closing.
 6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
 7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- E. Guards – Friction Fit - Where indicated in drawings:
 1. Basis of Design –
 - a. Best Materials, Ph. (800) 474-7570. Website: www.bestmaterials.com
 - b. Model - Saf-T-Hatch Rooftop Safety Rail, or equal.
https://www.bestmaterials.com/PDF_Files/JL-Roof_Hatch_Safety_Rail_STH_submittal.pdf
 2. Description:
 - a. Friction/compression fit guardrail system.

- b. 42" minimum above finished roof plane.
3. Finish Manufacture's standard.
 - a. Color: As selected by Architect from manufacturer's full range.
- F. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.
 1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
 2. Height: 42 inches above finished roof deck.
 3. Material: Steel.
 4. Post: 1-5/8-inch- diameter pipe.
 5. Finish: Manufacturer's standard baked enamel or powder coat.
 - a. Color: As selected by Architect from manufacturer's full range.

2.2 EQUIPMENT SUPPORTS

- A. Equipment Supports: metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed structure-mounting flange at bottom.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Zinc-coated (galvanized) steel sheet, 0.079 inch thick.
 1. Finish: Baked enamel or powder coat.
 2. Color: As selected by Architect from manufacturer's full range.
- D. Construction:
 1. Curb Profile: Profile as indicated on Drawings compatible with roofing system.
 2. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
 3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
 4. Nailer: Factory-installed continuous wood nailers 1-1/2 inches wide under top flange on side of curb, continuous around support perimeter.
 5. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
 6. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
 7. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.

8. Fabricate equipment supports to minimum height of 18 inches above roofing surface unless otherwise indicated.
9. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other (at mechanical equipment curbs as indicated on Sheet M5.1.1, and as noted elsewhere in the drawings. Equip supports with water diverters or crickets on sides that obstruct water flow.

2.3 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation.
 1. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.
 2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- B. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
- C. Aluminum Extrusions and Tubes: ASTM B221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.
- D. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.
- E. Steel Shapes: ASTM A36/A36M, hot-dipped galvanized according to ASTM A123/A123M unless otherwise indicated.
- F. Steel Tube: ASTM A500/A500M, round tube.
- G. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.
- H. Steel Pipe: ASTM A53/A53M, galvanized.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Cellulosic-Fiber Board Insulation: ASTM C208, Type II, Grade 1, thickness as indicated.
- C. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
- D. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.
- E. Underlayment:
 1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

2. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
- F. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
- G. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- H. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- I. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

2.5 ROOF TIE OFFS

- A. Guardian Fall Protection Co., CB-18 Anchor Point, or equal. Phone - (800) 466-6385.
Product Website Link: <https://www.guardianfall.com/performance-safety-products/anchor-points/product/cb-18-anchor-point>
- B. Substitutions per the requirements in Section 01 25 00, "Substitution Procedures".
- C. Applicable standards OSHA 1910, OSHA 1926 Subpart M, ANSI Z359.18-17* see instructions, and ANSI A10.32-12. min. Breaking strength – 5,000 lbs.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
 1. Test units for proper function and adjust until proper operation is achieved.
 2. Repair finishes damaged during installation.
 3. Restore finishes so no evidence remains of corrective work.
- B. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- C. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
- D. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 90 00, "Painting"
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 84 13
PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.

1.2 RELATED SECTIONS:

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 05 40 00 - Cold-Formed Metal Framing
- C. Section 06 10 00 - Rough Carpentry
- D. Section 07 92 00 - Joint Protection
- E. Section 09 22 36 – Cement Plaster Lathing and Lath Accessories
- F. Section 09 21 16 - Gypsum Board
- G. Division 21 - Fire Suppression
- H. Division 22 - Plumbing
- I. Division 23 - Heating, Ventilating, and Air Conditioning
- J. Division 26 - Electrical
- K. Division 27 – Communications
- L. Work may be required to be coordinated with other sections

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- B. ASTM E814 – Standard Test Method for Fire Tests of Penetration Firestop Systems
- C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems
- D. ASTM E 2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems
- E. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 - 1. UL 1479 – Standard for Fire Tests of Fire Resistant Pipe Protection Systems Carrying Combustible Liquids
 - 2. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems
 - 3. UL Fire Resistance Directory:
 - a. Firestop Devices (XHJI)
 - b. Fire Resistance Ratings (BXRH)

- c. Through-Penetration Firestop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
- F. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- G. NFPA 101 - Life Safety Code
- H. NFPA 70 - National Electric Code

1.4 SUBMITTALS

- A. Submittals: Provide submittals per Section 01 33 00, "Submittal Procedures".
- 1. Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified firestop systems to be used and manufacturer's installation instructions
 - 2. Submit safety data sheets provided with product delivered to job-site.
 - 3. Product test reports.
 - 4. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
 - a. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. The engineering judgment shall first be reviewed and accepted by the design team before it is submitted to DSA
 - b. Manufacturer's engineering judgment identification number and drawing details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in document.

1.5 QUALITY ASSURANCE

- A. Engage an experienced installer, with three years minimum experience who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
- B. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems that comply with specified requirements of tested systems.
- C. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- D. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in project to a single sole source firestop specialty contractor.
- E. The work is to be installed by a contractor with at least one of the following qualifications:
 - 1. FM 4991 Approved Contractor

2. UL Approved Contractor
3. Manufacture Accredited Fire Stop Specialty Contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

1.7 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND GENERAL REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 1. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
Website Link: <https://www.ul.com/>
 - 2) Intertek Group in its "Directory of Listed Building Products."
Website Link: <https://www.intertek.com/directories/>
- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service

and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
- D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

2.2 MANUFACTURERS (As Listed in Materials Section):

- A. Hilti Corporation – Firestop and Fire Protection Division,
Website Address: https://www.hilti.com/#nav/categories/CLS_FIRESTOP_PROTECTION_7131 , or equal
Phone: (800) 879-8000
- B. 3M Corporation – Firestop and Fire Protection Division,
Website Address: https://www.3m.com/3M/en_US/company-us/all-3m-products/~/All-3M-Products/Adhesives-Tapes/Industrial-Adhesives-and-Tapes/Firestopping-Products/?N=5002385+8710676+8710815+8711017+8719954+3294857497&rt=r3 , or equal
Phone: (888) 364-3577
- C. Substitutions: Provide per Section 01 25 00, “Substitution Procedures”

2.3 MATERIALS - FIRESTOP SEALANTS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. Acceptable Manufacturers/Products:
 - a. Hilti, “FS-ONE MAX”, Firestop Intumescent Sealant, or equal.
 - 1) Fire-rated, neutral elastomeric intumescent silicone sealant. Flame Spread = 0. Smoke Development = 10. Fire resistive joint system tested up to 3 hours in accordance with ASTM E84, E814, ASTM E1966, UL 1479 and UL 2079. California State Fire Marshal Listing No. 4485-1200:108 (approved for indoor use only by CSFM).

Product Website Link - General:

https://www.hilti.com/c/CLS_FIRESTOP_PROTECTION_7131/CLS_FIRES TOP_SEALANTS_SPRAYS_7131/r3859360

Product Website Link – Technical Data Sheet:

https://www.hilti.com/medias/sys_master/documents/hc7/h6f/9505276952606/Technical-information-ASSET-DOC-LOC-4226707.pdf

- b. 3M Fire Protection Products, “CP 25WB+ Firestop Sealant, or equal.
- 1) Fire-rated, latex based intumescent sealant. Flame Spread = 0. Smoke Development = 0. Fire resistive joint system tested up to 4 hours in accordance with ASTM E814, ASTM E1966, UL 1479 and UL 2079. Expansion ratio – 1:3, when exposed to temperatures above 1000°F. California State Fire Marshal Listing No. 4485-0941:116.

Product Website Link - General: https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-Fire-Barrier-Sealant-CP-25WB-/?N=5002385+3293123924&rt=rud

Product Website Link – Technical Data Sheet: <https://multimedia.3m.com/mws/media/201504O/3m-fire-barrier-sealant-cp-25wb-technical-data-sheet.pdf>

Product Website Link – Installation Options: <https://multimedia.3m.com/mws/media/1090533O/anz-tds-fire-barrier-cp25wb.pdf>

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
- B. Verify penetrations are properly sized and in suitable condition for application of materials.
- C. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
- D. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
- E. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
- F. Do not proceed until unsatisfactory conditions have been corrected.

3.2 COORDINATION

- A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

- C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.
- D. Do not cover up through-penetration fire stop and joint system installations that will become concealed behind other construction until each installation has been examined by the Inspector of Record (IOR) .

3.3 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.
- B. Comply with manufacturer's instructions for installation of through-penetration materials.
- C. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
- D. Install fill and forming materials by proven techniques to produce the following results:
 - 1. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 2. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
 - 3. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 4. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
 - 5. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 6. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- E. Protect materials from damage on surfaces subjected to traffic.

3.4 IDENTIFICATION

- A. Wall Identification:
 - 1. Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - a. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification:
 - 1. Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives

capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

- a. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
- b. Contractor's name, address, and phone number.
- c. Designation of applicable testing and inspecting agency.
- d. Date of installation.
- e. Manufacturer's name.
- f. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard
- B. Manufacturer's Field Services: Contractor to ensure a manufacturer's direct representative is on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. Training will be done per manufacturer's written recommendations published in their literature and drawing details. During installation, contractor shall have manufacturer's representative provide periodic visual observations and written documentation of the results.
- C. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- D. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION

SECTION 07 92 00
JOINT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior and Exterior Sealants
 - a. Silicone Joint Sealants.
 - b. Polyurethane Joint Sealants.
 - c. Mildew-Resistant Joint Sealants.
 - d. Butyl Sealants
 - e. Acoustical Sealants
 - f. Colored Sealant for Use With FRL Product, if applies.

1.2 REFERENCES

1. ASTM C510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
2. ASTM C639 – Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants
3. ASTM C679 – Standard Test Method for Tack-Free Time of Elastomeric Sealants
4. ASTM C719 – Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
5. ASTM C793 – Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants
6. ASTM C794 – Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
7. ASTM C834 - Standard Specification for Latex Sealants
8. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
9. ASTM C1135 – Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants
10. ASTM C1184 – Standard Specification for Structural Silicone Sealants
11. ASTM C1193 - Standard Guide for Use of Joint Sealants
12. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.
13. ASTM C1311 – Standard Specification for Solvent Release Sealants
14. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

15. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
16. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
17. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness

1.3 SUBMITTALS

- A. Submittals: Provide submittals per Section 01 33 00, “Submittal Procedures”.
- B. Product Data:
 1. Submit for each joint-sealant product.
 2. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.
 3. Testing Documentation:
 - a. Product test reports.
 - b. Preconstruction field-adhesion-test reports.
 - c. Field-adhesion-test reports.
- C. Submit sample color charts in PDF format approval for each kind and color of joint sealant required.
- D. Submit two physical samples of each color required for final selection and approval.
- E. Joint-Sealant Schedule: Include the following information:
 1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.
 5. Submit manufacturer's installation instructions under provisions of Section 01 77 19, “Closeout Requirements”

1.4 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years’ experience.
- B. Applicator: Company specializing in applying the work of this section with minimum three years’ experience, with projects of a similar size and type.
- C. Conform to Sealant Waterproofing and Restoration Institute requirements for materials and

installation.

- D. Prior to installation of joint sealants, field test adhesion to joint substrates.
 - 1. Install joint sealants in 5-foot joint lengths. Allow to cure before testing. Test adhesion by pulling sealant out of joint.
 - 2. Perform field tests for each type of elastomeric sealant and joint substrate.
 - 3. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 - 4. Report whether or not sealant in joint connected to pulled out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 - 5. Sealants not evidencing adhesive failure from testing, in absence of other indications of non-compliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrate during testing.

1.6 PERFORMANCE CRITERIA

- A. Environmental quality assurance:
 - 1. Do not use products containing Methylene Chloride or Chlorinated Hydrocarbons.
 - 2. Do not use products containing bactericides and fungicides that are classified as Phenol mercury acetates, phenol phenates, or phenol formaldehyde.
 - 3. Do not use products containing aromatic and aliphatic solvents.
 - 4. Do not use products containing Styrene Butadiene.
 - 5. Do not exceed VOC limits set for compliance by LEED.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install solvent curing sealants in enclosed building spaces.
- B. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
- C. Do not install sealants under adverse weather conditions or when temperatures are above or below manufacturer's recommended limitations for installation.
- D. Deliver materials in the unopened, original containers or unopened packages with manufacturer's name, labels, product identification, color, expiration period, curing time and mixing instructions for multi-component materials.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with all Sections referencing this Section.

1.9 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

- B. Warranty: Include coverage of installed sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.
- C. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- D. Exterior Sealants: Furnish a written warranty against leaks or other defects of materials and workmanship for a period of 10-years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS (As Listed in Materials Section):

- A. BASF Corporation, <https://www.basf.com/us/en.html> , or equal
Address: 100 Park Avenue, Florham Park, NJ 07932
Phone: (973) 245-6000 or (800) 243-6739
- B. Dow Chemical Corporation, <https://www.dow.com/en-us.html> , or equal
Phone: *800) 258-2436 or (925) 432-5000
- C. G.E. Silicones, www.ge.com/silicones , or equal
Phone: (800) 295-2392
- D. Pecora Corporation, <https://www.pecora.com/> , or equal
Phone: (201) 723-6051
- E. Sika Corporation, USA, <https://usa.sika.com/> , or equal
Phone: (201) 933-8800
- F. Tremco Corporation, USA, <https://www.tremcosealants.com/> , or equal
Phone: (800) 321-7906
- G. **Substitutions for all products in following sections per Section 01 25 00, "Substitution Procedures".**

2.2 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 MATERIALS - SILICONE JOINT SEALANTS

- A. **For use as an Exterior sealant and as a General Purpose sealant, unless otherwise noted.**
 - 1. Silicone, Single-component, non-sag, neutral-curing silicone joint sealant.
 - 2. ASTM C920, Type S (single component), Grade NS (no sag), Class 50 minimum (50% joint movement), Use NT (non-traffic), T (traffic), G (Glass), A (aluminum), and O (other)
 - a. Acceptable Manufacturers/Products:
 - 1) Dow Corning, "795" Silicone Building Sealant, or equal

Product Website Link: <https://www.dow.com/en-us/document-viewer.html?randomVar=6053868956057385559&docPath=/content/dam/cc/documents/en-us/productdatasheet/61/61-885-dowsil-795-silicone-building-sealant.pdf>

- 1) Sika USA, “Sikasil-N Plus”, or equal

Product Website Link: <https://usa.sika.com/dms/getdocument.get/4e189cc0-a256-3ab6-8883-14a4097a0459/Sikasil-N%20Plus%20US%20PDS%203.23.11.pdf>

- 2) Pecora Corporation, “864 NST”, or equal

Product Website Link: https://www.pecora.com/wp-content/uploads/2016/01/864NST_DS.pdf

- 3) Pecora Corporation, “898 NST”, or equal

Product Website Link: https://www.pecora.com/wp-content/uploads/2016/01/138995_898NST_Datasheet-Final.pdf

- 4) Tremco, “Tremcil 600”, or equal

Product Website Link:
<https://www.tremcosealants.com/markets/commercial/sealants-adhesives/silicone-sealants/tremcil-600/>

- 5) Tremco, “Spectrem 1”, or equal

Product Website Link:
https://www.tremcosealants.com/fileshare/DataSheets_Hyland/Spectrem_1_DS.pdf

B. For use in horizontal expansion joints in sidewalks, plazas, floors and other horizontal surfaces with slopes up to 6%, except as noted in Section 32 13 13, “Concrete Paving”.

1. Multicomponent, pourable silicone sealant, neutral-curing silicone joint sealant;
 - a. ASTM C920, Type M (multi-component), Grade P (pourable), Class 100/50(50% – 100% expansion), Uses - T (traffic) and NT (non-traffic), M (masonry), G (glass), A (aluminum) and O (other).
 - b. Acceptable Manufacturers/Products:
 - 1) Sika USA, “Sikasil-728 RCS”, or equal

Product Website Link: <https://usa.sika.com/en/construction/adhesives-sealants/joint-sealants/roadway-sealants/sikasil-728-rcs.html>

2.4 MATERIALS - POLYURETHANE JOINT SEALANTS

C. For use in horizontal expansion joints in sidewalks, plazas, floors and other horizontal surfaces with slopes up to 6%.

1. Polyurethane: Single-component, low modulus, traffic-rated, self-leveling and semi-self-leveling polyurethane joint sealants.

- a. ASTM C920, Type S (single component), Grade P (pourable), Class 25, minimum (25% joint movement) (or Class 35 or above allowed – 35% joint movement +), Uses - T (traffic), NT (non-traffic), M (masonry), A (aluminum), and O (other)
 - b. Acceptable Manufacturers/Products:
 - 1) Sika, USA “Sikaflex 1C SL” or equal
Product Website Link: <https://usa.sika.com/en/construction/adhesives-sealants/joint-sealants/architectural-sealants/polyurethane/sikaflex-1c-sl.html>
 - 2) Tremco, “Vulkem 45SSL”, or equal
Product Website Link:
<https://www.tremcosealants.com/markets/commercial/sealants-adhesives/urethane-sealants/one-part-polyurethane-sealants/vulkem-45ssl/>
 - 3) BASF Masterseal SL1
Product Website Link: <https://assets.master-builders-solutions.com/en-us/basf-masterseal-sl-1-tds.pdf>
 - 4) Pecora, “Urexpan NR-201”, or equal.
Product Website Link: https://www.pecora.com/wp-content/uploads/2016/01/Pecora_Urexpan_NR201_Datasheet-8-15.pdf
2. Polyurethane: Multi-component, low modulus, traffic-rated, self-leveling polyurethane joint sealants.
- a. ASTM C920, Type M (multi-component), Grade P (pourable), Class 25 minimum (25% joint movement) (or Class 35 or above allowed – 35% joint movement +). Use NT (non-traffic), T (traffic), and M (masonry), A (aluminum), O (other). Horizontal joint sealant shall have a minimum Shore A hardness of 30.
 - b. Acceptable Manufacturers/Products:
 - 1) Sika, USA, “Sikaflex 2C SL”, or equal
Product Website Link: <https://usa.sika.com/en/construction/adhesives-sealants/joint-sealants/roadway-sealants/sikaflex-2c-sl.html>
 - 2) Tremco, “THC 900”, or equal
Product Website Link:
<https://www.tremcosealants.com/markets/commercial/sealants-adhesives/urethane-sealants/two-part-polyurethane-sealants/thc-901/>
 - 3) BASF, “Masterseal SL 2”, or equal
Product Website Link: <https://www.master-builders-solutions.com/en-us/products/construction-sealants/masterseal-sl-2>
3. **For use in vertical building expansion joints.**
- a. Low-modulus, high-performance, 1-component, polyurethane-based, non-sag, elastomeric sealant. ASTM C-920, Type S (single component), Grade NS (non sag), Class 50, minimum (50% and above expansion). Use - T (traffic), NT (non-traffic), G (glass), A (aluminum), O (other), M (masonry).

- 1) Sika, USA “Sikaflex-15M” or equal
Product Website Link: <https://usa.sika.com/en/construction/adhesives-sealants/joint-sealants/architectural-sealants/polyurethane/sikaflex-15-lm.html>
 - 2) BASF, “Masterseal NP 150”, or equal (not listed for glass)
Product Website Link: <https://www.master-builders-solutions.com/en-us/products/construction-sealants/masterseal-np-150>
- b. Low-modulus, high-performance, multi-component, polyurethane-based, non-sag, elastomeric sealant. ASTM C-920, Type M (multi-component), Grade NS (non sag), Class 50 (50% expansion), use T (traffic), NT (non-traffic), M (masonry). G (glass), A (aluminum), and O (other).
- 1) Pecora, “DynaTrol II”
Product Website Link: https://www.pecora.com/wp-content/uploads/2016/01/139252_Dynatroll_II_PEC-128-Final.pdf

2.5 MATERIALS - MILDEW-RESISTANT JOINT SEALANTS

A. Sanitary sealant for wet areas, such as restrooms, janitor rooms, etc.

- a. Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth. Silicone rubber, mildew resistant, anti-microbial, acid curing, single-component, non-sag, nontraffic-use sealant.
- b. ASTM C920, Type S (single component), Grade NS (non sag), Class 25 (25% expansion), Use – NT (non-traffic), G (glass), A (aluminum), and O (other).
- c. Acceptable Manufacturers:
 - 1) GE Silicones; “SCS1700 Sanitary”, or equal.
Product Website Link: https://global-uploads.webflow.com/5dbc1154df87c0aaea47bac4/5e739ff46a448d472ad5a3ef_SCS1700%20Sanitary%20Data%20Sheet.pdf
Primer as required by manufacturer recommendations.
 - 2) Dow Chemical Corporation, “786 Mildew Resistant”
Product Website Link: <https://www.dow.com/en-us/document-viewer.html?randomVar=8085541923078678452&docPath=/content/dam/cc/documents/en-us/productdatasheet/95/95-10/95-1047-01-dowsil-786-silicone-sealant.pdf>
For metals, laminate and plastics use DOWSIL 1200 OS Primer, or as recommended by manufacturer.
Product Website Link: <https://www.dow.com/documents/en-us/productdatasheet/63/63-11/63-1178-01-dowsil-1200-os-primer.pdf?iframe=true>
- d. Substitutions per Section 01 25 00, “Substitution Procedures”.

2.6 MATERIALS - BUTYL SEALANTS

A. For glazing and similar applications

- a. One-part gun grade caulking, sealing and glazing compound formulated from virgin butyl rubber. Compliant with the requirements of Federal Specification AAMA 808.3-05,
- b. ASTM C1311 (+/- 7.5% joint movement), TT-S-001657, Type I and TT-C-1796A,
- c. Acceptable Manufacturer:
 - 1) Pecora, “BC-158 Butyl Rubber Sealant”, or equal.
Product Website Link: <https://www.pecora.com/wp-content/uploads/2016/01/BC-158.pdf>
 - 2) Tremco, “Butyl Sealant”, or equal
Product Website Link: <https://www.tremcosealants.com/markets/commercial/sealants-adhesives/specialty-sealants/tremco-butyl-sealant/>
- d. Substitutions per Section 01 25 00, “Substitution Procedures”.

2.7 MATERIALS - ACOUSTICAL SEALANTS

A. Acoustical Sealant for Concealed Joints:

1. Single component, non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.
2. Acceptable Manufacturers/Products:
 - 1) Tremco “Tremco Acoustical Sealant”, or equal
Product Website Link: <https://usa.sika.com/dms/getdocument.get/4e189cc0-a256-3ab6-8883-14a4097a0459/Sikasil-N%20Plus%20US%20PDS%203.23.11.pdf>
 - 2) Pecora Corp. “BA-98”, or equal
Product Website Link: <https://www.pecora.com/wp-content/uploads/2016/01/BA-98.pdf>

B. Acoustical Sealant for Exposed Joints:

1. Non-oxidizing, skinnable, paintable, gunnable acrylic and silicone sealant recommended for sealing interior exposed joints to reduce transmission of airborne sound.
2. Acceptable Manufacturers/Products:
 - 1) Pecora Corp. “AC-20”, or equal
Product Website Link: https://www.pecora.com/wp-content/uploads/2016/02/Pecora_AC-20_Datasheet_2-16.pdf

2.8 FIRE-RATED SEALANTS

- A. See Section 07 84 13, “Penetration Firestopping” for rated through penetration sealants.

2.9 COLORED SEALANT FOR USE WITH FRL

A. **For use with Section 06 64 01 - Fiber Reinforced Laminate (FRL)”.**

1. Moisture resistant 100% RTV silicone sealant. VOC Compliant <30 g/L.

Service Temperature – (-35° F to 350°F). Flexibility (25%).

a. Acceptable Manufacturer:

- b. ColorRite Incorporated, 600 S. Ranchwood Blvd., Yucon, OK 73099.

Phone (405) 354-3644

- 1) ColorRite, “Color Sil”, or equal.

Product Website Link: <https://colorriteinc.com/color-sil/>

2.10 JOINT-SEALANT BACKING

- A. Sealant Backer Rods: ASTM C1330, Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

a. **Acceptable Manufacturers – Cylindrical Sealant Backer Rods:**

- 1) Alcot Plastics Ltd.; “ALCOT Soft Type Backer Rod”, or equal.

Product Website Link: <https://alcotplastics.com/soft-backer-rod/products.html>

- 2) Nomaco, “SOF ROD”, Bi-Cellular Polyethylene Backer Rod, or equal.

Product Website Link: https://www.nomaco.com/wp-content/uploads/2016/09/cp_0031_sofrod_0916.pdf

- 3) W.R. Meadows Foam Backer Rods

Product Website Link: <https://www.wrmeadows.com/backer-rods/>

b. **Acceptable Manufacturers – Wide Joint Expansion Joint Fillers (Bond Breakers):**

- 1) Nomaco, “NOMAFLEX”, Closed Cell Polypropylene Foam Bond Breaker, or equal.

Product Website Link: https://www.nomaco.com/wp-content/uploads/2020/05/cp_0030_nomaflex_0520_lowres.pdf

- 2) W.R. Meadows, “DECK-O-FOAM” Expansion Joint Filler, or equal.

Product Website Link: <https://www.wrmeadows.com/deck-o-foam-expansion-joint-filler/>

2.11 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that surfaces and joint openings are ready to receive work and field measurements are as shown on Drawings and recommended by the manufacturer.
- B. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Clean and prime joints in accordance with manufacturer's instructions.
 - 2. Remove loose materials and foreign matter which might impair adhesion of sealant.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- C. Verify that joint backing and release tapes are compatible with sealant.
- D. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- E. Protect elements surrounding the work of this Section from damage or disfiguration.
- F. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or acid washing to produce a clean, sound substrate. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints.
- G. Clean metal, glass, glazed surfaces of ceramic tile and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealants.
- H. Beginning of installation means installer accepts existing surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Provide temporary ventilation during installation of interior joint sealants.

- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- D. Install bond-breaker tape behind sealants where cylindrical sealant backer rods are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Caulk all exterior joints and openings in the building envelope that are observable sources of air infiltration.
- G. Measure joint dimensions and size materials to achieve required width/depth ratios.
- H. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width. Roll the material into the joint to avoid lengthwise stretching. Do not twist or braid rod stock.
- I. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges. Apply masking tape where required to protect adjacent surfaces from sealant application.
- J. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- K. At all surface mounted light fixtures mounted on gypsum board ceilings, contractor shall caulk light fixture body to ceiling finish to eliminate gap between metal body and fixture. Coordinate locations with drawings.
- L. Tool joints concave.
- M. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 1. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 2 tests for the first 1,000 feet of joint length for each kind of sealant and joint substrate.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other

requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 CLEANING AND REPAIRING

- A. Clean work under provisions of Section 01 74 00.
- B. Clean adjacent soiled surfaces. Use a solvent or cleaning agent as recommended by the sealant manufacturer.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.5 PROTECTION OF FINISHED WORK

- A. Protect finished installation under provisions of Section 00 72 00.
- B. Protect sealants until cured.
- C. Do not paint sealants until sealant is fully cured.
- D. Do not paint silicone sealant.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED WORK

- A. Specifications apply to steel doors, steel door frames, and steel frame components such as sidelites, borrowed lites, transom frames and architectural stick assemblies as shown on architects' plans and schedules, as manufactured by Steelcraft, Ceco, or Equal and as conforming to ANSI A250.8-1998 (SDI-100).

1.2 SECTION INCLUDES

- A. Non-Rated and Rated Steel Doors.
- B. Non-rated and Rated Metal Frames.
- C. Door Glazing.
- D. Door Louvers.

1.3 RELATED SECTIONS

- A. Section 08 41 13 – Aluminum Storefronts, Entrances and Windows
- B. Section 08 71 00 - Finish Hardware.
- C. Section 08 81 00 - Glass Glazing.
- D. Section 09 91 00 - Painting - Interior and Exterior

1.4 REFERENCES

- A. ANSI A250.3 – Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames
- B. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing
- C. ANSI A250.6 (SDI 107) – Hardware on Standard Steel Doors (Reinforcement Application)
- D. ANSI A250.7 – Nomenclature for Steel Doors and Steel Door Frames
- E. ANSI A250.8 (SDI-100) – Recommended Specifications for Steel Doors & Frames
- F. ANSI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
- G. ANSI/DHI A115 Specifications for Hardware Preparations in Standard Steel Doors and Frames
- H. ANSI/DHI A115.IG Installation Guide for Doors and Frames
- I. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- J. ASTM A366/A366M-97e1 - Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.

- K. ASTM A568 / A568M-15 – Standard Specifications for Sheet Steel and Strip, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
- L. ASTM A653 – Standard Specification for Steel, Sheet, Zinc-Coated (Galvannealed) by the Hot-Dip Process
- M. ASTM A924 / A924M-16ae1 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- N. ASTM A1011 / A1011M-15 - Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy High Strength Low Alloy with Improved Formability, and Ultra-High Strength
- O. ASTM A1008M-16 – Standard Specifications for Steel Sheet, Cold -Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- P. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus
- Q. ASTM D1735 - Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus
- R. ASTM E152 – Standard Methods of Fire Tests of Door Assemblies
- S. ASTM E283 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- T. Steel Door Institute
 - 1. SDI 105 – Recommended Erection Instructions for Steel Frames
 - 2. SDI 106 – Recommended Standard Door Type Nomenclature
 - 3. SDI 108 – Recommended Selection and Usage Guide for Standard Steel Doors
 - 4. SDI 109 – Hardware for Standard Steel Doors & Frames
 - 5. SDI 110 – Standard Steel Doors & Frames for Modular Masonry Construction
 - 6. SDI 111 – Recommended Standard Details for Steel Doors and Frames
 - 7. SDI 112 – Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors & Frames
 - 8. SDI 122 – Installation and Troubleshooting Guide for Standard Steel Doors and Frames
 - 9. SDI 124 – Maintenance of Standard Steel Doors and Frames
- U. Fire Protection
 - 1. UL 10B Fire Tests of Door Assemblies (Neutral test pressure)
 - 2. UL 10C Standard for Safety for Positive Pressure Fire Tests of Door Assemblies
 - 3. NFPA 252 Fire Tests of Door Assemblies (Neutral test pressure)
 - 4. UBC 7-2-1997 Positive Pressure Fire Tests of Door Assemblies
 - 5. NFPA 80 Standard for Fire Doors and Fire Windows

1.5 REGULATORY REQUIREMENTS

- A. When rated, doors and frames shall conform to applicable codes for fire ratings. All interior vertical stairwell doors shall carry a minimum 250F temperature rise rating in addition to the required fire rating.

1.6 QUALITY ASSURANCE

- A. Provide door and frame complying with Steel Door Institute "Recommended Specifications for Standard Steel Door and Frames" (SDI 100), and as herein specified.
- B. Conform to requirements of ANSI A250.8 (SDI-100), ANSI A151.1, and other specifications herein named. Test reports shall be submitted upon request.
- C. Acoustical qualities: Doors shall have a minimum sound transmission classification of 28 as tested under ASTM designation E490 and ASTM designation E413.
- D. Insulation properties: Doors shall have a U factor .363 (R factor of 2.85) for honeycomb core, U factor for polystyrene core of .263 (R factor of 3.8), U factor for polyurethane core of 0.09 (R factor of 11.1).
- E. Only companies that are current members of SDI (Steel Door Institute) in good standing will be considered as acceptable manufacturers.
- F. Fire-rated door and frame assemblies shall be in accordance with ASTM E2074 and labeled by U.L., Factory Mutual, Warnock Hersey, or other acceptable testing and inspecting organization having jurisdiction.
- G. All doors requiring fire rating shall conform to the California State Fire Marshal Standard 12-43.4 Fire Rated Door Tests.
- H. Underwriters' Laboratories and Warnock Hersey, labeled fire doors and frames:
 - 1. All labeled fire doors and frames shall be of a type which has been investigated and tested in accordance with UL-10(b), ASTM E-152, NFPA 252, ANSI A2.2, or UL10(c).
 - 2. Underwriters' Laboratories labeled doors and frames shall be manufactured under the UL factory inspection program and in strict compliance to UL procedures, and shall provide the degree of fire protection, heat transmission and panic loading capability indicated by the opening class.
 - 3. Warnock Hersey labeled doors and frames shall be manufactured to meet the specific requirements of that labeling agency's current procedure for the tested hourly rating designated and shall be subject to inspection by representatives of the labeling agency.
 - 4. physical label or approved marking shall be affixed to the fire door or fire door frame, at an authorized facility as evidence of compliance with procedures of the labeling agency.

1.7 SUBMITTALS

- A. Provide submittals per Section 01 33 00, "Submittal Procedures".
- B. Submit shop drawings and product data. Include illustrations and schedule of finish hardware, door and frame size, type, material, construction, finishing, anchoring, accessories, and preparation for installing hardware.
- C. Indicate frame configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, and finish.

- D. Indicate door elevations, internal reinforcement, closure method, and cutouts for glazing and louvers.
- E. Method of attachment of frames to structure shall be approved by Architect.
- F. Submit manufacturer's installation instructions.
- G. Templates: Furnish hardware templates to fabricator of frames and doors to be factory prepared for installation of hardware.
- H. General Contractor to confirm field measurements of all openings prior to submittal and fabrication of doors and frames.

1.8 DELIVERY, STORAGE AND PROTECTION

- A. Deliver all materials under protective cover and store in upright position within a dry enclosed space in a manner that will prevent rust and damage per the provisions in Section 01 60 00, "Product Requirements"
- B. Do not create a humidity chamber by using a plastic or canvas shelter that is not adequately vented.
- C. Storage of Doors: Doors shall be stored in an upright position under cover. Place the units on at least 4" wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create humidity chamber and promote rusting. If the corrugated wrapper on the door becomes wet, or moisture appears, remove the wrapper immediately. Provide a 1/4" space between the doors to promote air circulation.
- D. Storage of Frames: Frames shall be stored under cover on 4" wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. Assembled frames shall be stored in a vertical position, five units maximum in a stack. Provide a 1/4" (6.35 mm) space between frames to promote air circulation.

1.9 WARRANTY

- A. All doors and frames have a limited warranty to be free from defects in material and workmanship for a period of one year from Substantial Completion.
- B. NOTE: Allegion will provide an additional two-year warranty on their door hardware products if they are installed in Steelcraft doors and frames.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Basis of Design - Steelcraft; An Allegion Company
 - 1. Contact: TBD (District Hardware Consultant)
 - 2. Substitutions per Section 01 25 00, "Substitution Procedures".

2.2 MATERIALS - FRAMES:

- A. General: Pressed metal frames shall be formed to shapes shown. General Contractor to field

verify size of all frames. Head and jambs are to be notched, mitered, fully welded and finished to present a smooth surface for painting.

- B. Frames and frame components shall be manufactured from commercial quality carbon steel conforming to ASTM designation A568 and A569
- C. All doors, frames and frame components shall be cleaned, phosphatized and finished as standard with one coat of rust inhibiting prime paint in accordance with ANSI A250.10.
- D. Preparation for Hardware: Frames shall be prepared at the factory for all hardware using templates furnished by hardware supplier. Locations of miscellaneous hardware shall conform to the recommendations for the Door and Hardware Institute. Mortise, reinforce, drill and tap for all mortise type hardware. Reinforce for surface applied hardware, the drilling and tapping for which is to be done in the field door erector.
- E. All hardware cutouts shall have steel plate reinforcements with tapped holes welded to frame. Reinforcement shall include 3/16" butt reinforcement; 12 gauge lock strike; 14 gauge for surface applied items.
- F. Provide for three (3) rubber door silencers at single doors and (2) silencers at head of pair doors. Omit holes at frames to receive unitized weatherstripping; refer to Section 08712.
- G. Combination and Window Frames: Furnish units for fixed glass, fabricated to the designs and dimensions indicated. Provide metal glazing stops and moldings for field assembly with countersunk oval head self-tapping screws spaced not over 16 inches o.c. Frames shall be complete with anchors.
- H. Rated Doors and Frames: All fire rated doors and frames shall have a metal label, permanently fastened to the jamb indicating the fire rating and Test Agency name. **Do not apply primer or paint over fire rating labels.**
- I. Interior Doors and Frames
 - 1. SDI Heavy Duty: SDI A250.8, Level 2. Uncoated, cold-rolled steel sheet.
 - a. Edge Construction: Model 2, Seamless.
 - b. Core: Manufacturer standard.
 - 1) Standard Doors: Provide foamed in place polyurethane core, minimum 1.0 pcf density, R value of 12.5.
 - 2) Fire Rated Doors: Provide core as required to comply with rating shown on drawings.
 - c. Frames: Face welded.
 - d. Exposed Finish: Prime.
 - e. Typical Use: High abuse areas, utility/service rooms.
- J. Exterior Doors and Frames
 - 1. SDI Extra Heavy Duty: SDI A250.8, Level 3. Metallic-coated, cold-rolled steel sheet.
 - a. Edge Construction: Model 2, Seamless.
 - b. Core: Manufacturer's standard.
 - c. Frames Face welded.

- d. Exposed Finish: Prime.
- e. Typical Use: All exterior openings.

2.3 MATERIALS – DOORS:

- A. Exterior doors shall be 16 gauge hot dipped galvanized steel, with closed tops.
- B. Interior doors shall be 16 gauge commercial quality carbon steel
- C. Construction of Doors:
 - 1. Flush Doors
 - a. From commercial quality carbon steel for 1-3/4" doors. Doors shall be reinforced, sound deadened and insulated with impregnated Kraft honeycomb core completely filling the inside of the doors and laminated to inside faces of both panels using contact adhesive applied to both panels and honeycomb core.
 - b. Door shall have continuous vertical mechanical interlocking joints at lock and hinge edges with visible edge seams or with edge seam filled and ground smooth. The internal portion of the seam shall be sealed with epoxy. An intermittent fastening along the seam is not permitted. **Doors shall have beveled (1/8" in 2") hinge and lock edges. Top and bottom steel reinforcement channels shall be galvanized 14 gage and projection welded to both panels.
 - c. Hinge reinforcements shall be 7 gage for 1-3/4" doors. Lock reinforcements shall be 16 gage and closer reinforcements 14 gage - box minimum 6" high and 20" long. Hinge and lock reinforcements shall be projection welded to the edge of the door. Galvanized doors shall have galvanized hardware reinforcements.
 - d. Adequate reinforcements shall be provided for other hardware as required.
 - e. Glass trim for doors with cutouts shall be 24 gage steel conforming to ASTM designation A 366 cold rolled steel. The trim shall be installed into the door as a four sided welded assembly. The trim shall cap the cutout but shall not extend more than 1/16" from the door face. The corners of the assembly shall be mitered, reinforced and welded. The trim shall be the same on both sides of the door. Exposed fasteners shall not be permitted. Label and non-label doors shall use the same trim.
 - f. Doors indicating divided glass lites shall be made using a door with a cutout and trim for one piece of glass. The small lites shall be created by an extruded aluminum grille work mechanically fastened to the glass lite trim on both sides of the door. The grille work sections shall be beveled on the exposed side and shall have a flange on the unexposed side to which glazing tape can be applied. The grille work shall be installed into both sets of glass trim prior to installing into the door. One glass trim and muntin assembly shall be installed into the door prior to glazing. After glazing the other glass trim and muntin assembly shall be installed into the door.
 - g. All exterior out swing doors shall have the tops closed to eliminate moisture penetration. Door tops shall not have holes or openings. Top caps are permitted.
 - h. NOTE: Doors to be certified to have passed at least 5 million cycles in an independent cycle test.
 - D. Substitutions: Provide per Section 01 25 00, "Substitution Procedures"

Possible Acceptable Alternates

- A. Curries 707 Series Doors
- B. Ceco Legion Series Doors

2.4 FRAMES

- A. Exterior frames shall be 14 gauge hot dipped galvanized steel.
- B. Interior frames shall be 16 gauge commercial quality carbon steel
- C. Construction Frames:
 - 1. Flush Frames
 - a. F-Series flush frames shall be formed from 16 commercial quality carbon steel or galvanized steel
 - b. F-Series frames shall have 2" facesback welded with full penetration through to the face, ground down and smoothed. Miter corners shall have reinforcements with four concealed integral tabs for secure and easy interlocking of jambs to head.
 - c. Frames for 1-3/4" doors shall have 7 gage universal steel hinge reinforcements prepared for 4-1/2" x 4-1/2" standard or heavy weight template hinges. Strike reinforcements shall be 16 gage (1.3mm) and prepared for an ANSIA115.1-2 strike.
 - d. Steel plaster guards shall be provided for all mortised cutouts. All hinge and strike reinforcements shall be projection welded to the door frame. Reinforcements for surface applied door closers shall be 14 gage steel.
 - e. Galvanized frames shall have galvanized hardware reinforcements. Adequate reinforcements shall be provided for other hardware when required. F-Series frames shall be furnished with a minimum of six wall anchors and two adjustable base anchors of manufacturer's standard design. FN-Series frames shall be furnished with a minimum of six wall anchors and two fixed base anchors.
 - f. Steel plaster guards shall be provided for all mortised cutouts.
 - g. All hinge and strike reinforcements shall be projection welded to the door frame.
 - h. Reinforcements for surface closer shall be 14 gage steel. Adequate reinforcements shall be provided for other hardware when specified.
 - i. Galvanized frames shall have galvanized hardware reinforcements.
 - 2. Drywall Frames
 - a. DW and K-Series drywall frames shall be formed from 18 or 16 gage commercial quality carbon steel or galvanized steel. DW and K-Series frames shall be formed with double return backbends to prevent cutting into the drywall surface. Frames shall be knocked down, designed to be securely installed in the rough opening after wallboard is applied. Mitered corners shall be reinforced with a wedge lock corner clip to provide a firm interlock of jambs to head.
 - b. Frames for 1-3/4" doors shall have 7 gage steel hinge reinforcements and preparation for 4-1/2" x 4-1/2" standard weight template hinges. Strike jamb shall have 16 gage strike reinforcement and preparation for ANSI A115.1-2 strike. Strike jamb shall have 14 gage reinforcement and preparation for ANSI A115.3 strike.

- c. Each jamb shall have an adjustable compression anchor located 4" from the top of the door opening to hold the frame in rigid alignment. DW-Series frames shall have a welded-in base anchor attaching plate in each jamb for field installation of loose base anchors. K-Series frames shall have a dimpled hole in each face, near the bottom of each jamb for screw anchoring the base of frame to the wall construction.
3. Construction of Architectural Stick Components
 - a. Architectural stick frame assemblies shall be made of standard frame components, manufactured from 16 gage or 14 gage commercial quality carbon steel or galvanized steel. Where sticks are used at door openings and frame assemblies, they shall be prepared for hardware as specified. Frame assemblies shall be fabricated from three basic components:
 - 1) Open sections (perimeter members), closed sections (intermediate members), and sill sections.
 - 2) Open sections shall be identical in configuration to Steelcraft standard frames.
 - 3) Closed sections shall have identical jamb depths, face dimensions and stops as open sections. Closed sections shall be factory assembled and shall have full length internal reinforcement of 16 gage steel, factory spotwelded to both soffits at 8" on center.
 - 4) Sill sections shall be fabricated from galvanized steel and shall be either flush with both faces of adjacent vertical members or recessed from one face of the adjacent vertical members.
 - b. Individual components shall be cut to length and notched to assure square joints and corners. All joints and corners of the frame assembly shall be welded and ground smooth at the face of the sections. Frame assemblies shall be shipped to job site completely welded. Field joints shall be permitted only when the size of the total assembly exceeds shipping limitations. When frame assemblies are subjected to windloads, vertical members shall be free of field splices.
 - c. When specified, steel panels shall be furnished 3/8" or 1-3/4" thick as required. 3/8" panels shall be made of 18 gage cold-rolled steel faces with a corrugated fiberboard filler. 1-3/4" panels shall be made of 20 gage cold rolled steel faces with a honeycomb core. Cores shall be laminated to inside faces of both panels. Stick components and panels shall be furnished as specified in Section 2.01. Steel channel glazing beads shall be provided with assemblies for all areas in which glass or panels are to be installed and shall be pierced and dimpled for oval head sheet metal screws.
 - d. All necessary anchors for jambs, heads and sills of assemblies shall be provided. When verification of field dimensions are necessary, they shall be made by the contractor. Frame fabrication shall not begin until these dimensions have been submitted.

D. Substitutions: Provide per Section 01 25 13, "Substitution Procedures"

2.4 FINISH AND PROTECTIVE COATINGS

- A. All surfaces shall be cleaned, phosphatized, and given one coat rust-inhibiting prime paint in accordance with the Steel Door Institute Specification "Test Procedure and Acceptance Criteria for Primer Painted Steel Doors and Frames".

- A. Field paint doors and frames under provisions of Section 09 91 00, "Painting - Interior and Exterior" Section 09 91 00
- B. The inside of all frames shall be fully grouted

2.5 FABRICATION

- A. Set up and welded with faces welded and ground smooth. Miters of frames shall be back welded. Weld shall penetrate the outside face. Faces shall be dressed smooth and prime painted. Filler materials are not permitted.

2.6 FINISH

- A. All doors, frames and frame components shall be cleaned, phosphatized and finished as standard with one coat of rust inhibiting prime paint in accordance with the ANSI A250.10 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames".
- B. Factory finish painted doors and frames shall be cleaned, phosphatized and finished with rust inhibiting paint capable of passing a 200-hour salt spray and 480-hour humidity test in accordance with ASTM designation B117 and ASTM designation D1735. Finish paint shall be in accordance with ANSI/SDI A250.3, "Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames"

2.7 ACCESSORIES

- A. Door Louvers: Louvers shall be as indicated on the drawings; blade and frame configuration shall be manufacturer's standard or as specified elsewhere. 18 gauge, non-vision, inverted split "Y louver with 12 gauge security grille two sides, prime coat finish for field painting. Provide optional galvanized attached mesh insect screen. Size as shown on Drawings.
- B. Air Louvers Inc., Model 1500-A.
- C. Door Vision Panels without privacy door: Vision Lites shall be as indicated on the drawings; moldings shall be manufacturer's standard. 20 ga.cold rolled steel, for 1-3/4" doors, unless otherwise noted use with 1/4" thick glazing, prime coat finish for field painting. Size as shown on drawings.
 - 1. Anemostat LoPro Metal Vision Frame.
 - 2. Air Louvers Inc. Model VSL – Slimline.
 - 3. Note the specific requirements for acoustic glazing on labeled doors
- D. Door Vision Panels with privacy door: 20 ga.cold rolled steel, for 1-3/4" doors, unless otherwise noted use with 1/4" thick glazing, prime coat finish for field painting. Size as shown on drawings.
 - 1. Air Louvers Inc. Model PDVSL.
 - 2. Anemostat, model LoPro-SC.
 - 3. Note the specific requirements for acoustic glazing on labeled doors
- E. PeepHoles: Schlage 190 Degree Wide Angle Viewer. Satin nickel finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Doors and frames shall be installed in accordance with ANSI/DHI A115.IG Installation Guide for Doors and Frames and manufacturer's requirements.
- B. Set Frame level and plumb, and brace adequately to prevent damage or distortion. Secure standard height frames to structure with minimum of three anchors at each jamb. Provide one additional anchor per 18" above standard height.
- C. Attach to wooden structure with 16d nails on both sides of each strap into stud.
- D. Where applies, attach to existing masonry structure with masonry anchors of appropriate length to penetrate masonry a minimum of 2". Bondo screw heads, sand smooth to conceal fasteners.
- E. Removable Spreaders: Size opening by inserting wood spreader cut to the exact opening width and fasten sill anchor at strike jamb with nails or screws. Remove spreader. Insert adjusting screw cover.
- F. If knock-down frame is used, contractor shall shim between new frame and existing rough opening. Gap shall be fully filled all around frame.
- G. Door Installation: Fit hollow door accurately in the frame with a tolerance of 1/8" at jamb and head.
- H. Fit hollow metal door in existing wood framed opening (jamb) with a tolerance of 1/8" at jamb and head.

3.2 ERECTION TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.
- B. New doors shall have maximum 3/8" undercut above finished floor with no threshold and 3/4" undercut above finished floor with threshold.

3.3 ADJUST AND CLEAN

- A. Prime Coat Touch-Up: Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer. Touch-up shall not be obvious.
- B. Cleaning and Finishing: Upon completion of the work, clean all exposed surfaces, removing any discoloration or foreign matter, and touch up all abraded or cut areas and exposed edges with finishing material recommended by the manufacturer. Touch-up of finish shall not be obvious.
- C. Final Adjustments: Check and readjust operating finish hardware in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition.
- D. Defective Work: Remove and replace defective work, including doors and frames which are warped, bowed or otherwise damaged as directed by the Architect, with no additional cost to the Owner.
- E. Protection: Protect installed hollow metal work against damage from other construction work.

3.4 CLEAN-UP

- A. Upon completion of the work of this section, remove all excess materials, rubbish and debris

from the premises.

END OF SECTION

SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access doors and frames for walls and ceilings.

1.2 SUBMITTALS

- A. Product Data: For each type of product.
B. Product Schedule: For access doors and frames.

1.3 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Exposed Flanges :
1. Basis-of-Design Product: Subject to compliance with requirements, provide Babcock-Davis; Architectural Access Door (BNT) or comparable product by one of the following:
 - a. Acudor Products, Inc., or equal.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group, or equal..
 2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
 3. Locations: Wall.
 4. Stainless Steel Sheet for Door: Nominal 0.062 inch, 16 gage, ASTM A480/A480M No. 4 finish.
 5. Frame Material: Same material, thickness, and finish as door.
 6. Latch and Lock: Cam latch, key operated.
- B. Flush Access Doors with Concealed Flanges :
1. Basis-of-Design Product: Subject to compliance with requirements, provide Nystrom, Inc.; or comparable product by one of the following:
 - a. Babcock-Davis.
 - b. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - c. Cendrex Inc.; AHD-GYP - General Purpose Access Door with Drywall Bead Flange
 2. Substitutions per the requirements in Section 01 62 00, "Product Options".

3. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
 4. Locations: Ceiling.
 5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage factory primed.
 6. Frame Material: Same material and thickness as door.
 7. Latch and Lock: Cam latch, screwdriver operated with interior release.
- C. Substitutions: Substitutions per the requirements in Section 01 25 00, "Substitution Procedures".

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM = A36/A36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 316. Remove tool and die marks and stretch lines, or blend into finish.
- E. Stainless Flat Bars: ASTM A666, Type 316. Remove tool and die marks and stretch lines, or blend into finish.
- F. Frame Anchors: Same material as door face.
- G. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.3 FABRICATION

- A. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- C. Latch and Lock Hardware:
 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
 2. Keys: Furnish two keys per lock and key all locks alike.
 3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 08 71 00, "Door Hardware."

2.4 FINISHES

- A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.
 - a. Color: As selected by Architect from full range of industry colors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Adjust doors and hardware, after installation, for proper operation.

3.2 FIELD QUALITY CONTROL

- A. Inspection Agency: Owner will engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 1. Fire-Rated Door Inspections: Inspect each fire-rated access door in accordance with NFPA 80, section 5.2.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

END OF SECTION

SECTION 08 33 00
ROLLING SERVICE DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Rolling service doors.
- B. Insulated rolling service doors.
- C. Rolling sheet doors.
- D. Springless rolling service doors
- E. Advanced performance rolling service doors.
- F. Rolling security shutters.

1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Support framing and framed opening.
- B. Section 06200 - Finish Carpentry: Wood jamb and head trim.
- C. Section 08710 - Door Hardware: Product Requirements for cylinder core and keys.
- D. Section 09900 - Painting: Field applied finish.
- E. Section 16130 - Raceway and Boxes: Conduit from electric circuit to door operator and from door operator to control station.
- F. Section 16150 - Wiring Connections: Power to disconnect.

1.3 REFERENCES

- A. ANSI/DASMA 108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.
- B. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.
- C. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.
- D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

- E. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- F. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- G. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- H. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- J. NEMA MG 1 - Motors and Generators.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Details of construction and fabrication.
 - 4. Installation instructions.
- C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

- A. Warranty: Manufacturer's limited door and operator system, to be free from defects in materials and workmanship for 3 years or 500,000 cycles, whichever occurs first.
- B. Warranty: Manufacturer's limited door warranty for 5 years on door system materials and workmanship.
- C. Warranty: Manufacturer's limited door system warranty for 2 years for all parts and components.
- D. PowderGuard Finish
 - 1. PowderGuard Premium Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Premium Finish warranty for 2 years.
 - 2. PowderGuard Zinc Base Coat applied to guides, bottom bar, headplates plus PowderGuard Premium applied to curtain and top coat for guides, bottom bar, headplates: Manufacturer's limited Zinc Finish warranty for 4 years.

3. PowderGuard Textured: Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Textured Finish warranty for 3 years.
4. PowderGuard Zinc Base Coat applied to guides, bottom bar, headplates plus PowderGuard Textured applied to curtain and top coat for guides, bottom bar, headplates: Manufacturer's limited Zinc Finish warranty for 4 years.
5. PowderGuard Max: Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Max Finish warranty for 5 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.
- B. Or approved equal.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 25 13.

2.2 ROLLING SERVICE DOORS

2.3 Door Designation H A7.1.1

- A. Industrial Doors: Overhead Door Corporation, Model 610S Rolling Service Doors.
 1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - a. Flat profile type F-265 for doors up to 18 feet 4 inches (5.59 m) wide, fabricated of:
 - 1) 20 gauge galvanized steel.
 - b. For fenestrated service doors, provide slats with 3 inches by 5/8 inch (76 mm by 16 mm) uniformly spaced openings.
 2. Slats and Hood Finish:
 - a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
 - 1) Powder Coat:
 - (a) PowderGuard Premium powder coat, color as selected by the Architect. Coordinate with color selections A5.1.1
 3. Weatherseals:
 - a. Vinyl bottom seal.
 - b. Guide weatherseal.
 4. Bottom Bar:
 - a. Extruded aluminum for doors up to 15 feet 4 inches (4.67 m) wide.
 5. Guides: Three structural steel angles.
 6. Brackets:
 - a. Hot rolled prime painted steel to support counterbalance, curtain and hood.
 - b. Galvanized steel to support counterbalance, curtain and hood.
 7. Finish; Bottom Bar, Guides and Brackets:
 - a. PowderGuard Premium powder coat in black color.

8. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
9. Hood:
 - a. 24 gauge galvanized steel with intermediate supports as required.
10. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - a. Sensing Edge Protection:
 - 1) Electric sensing edge.
 - b. Operator Controls:
 - 1) Push-button and key operated control stations with open, close, and stop buttons.
 - 2) Controls for interior location.
 - 3) Controls surface mounted.
 - c. Special Operation:
 - 1) Vehicle detector operation.
 - d. Motor Voltage: 115/230 single phase, 60 Hz.
11. Wind Load Design:
 - a. Standard wind load shall be 20 PSF.
12. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.
13. Locking:
 - a. Interior slide bolt lock for electric operation with interlock switch.
14. Wall Mounting Condition:
 - a. Face-of-wall mounting.
15. Vision Lites: Provide with 3 inches by 5/8 inch (76 mm by 16 mm) uniformly spaced openings.
 - a. Provide with Plexiglas covers over openings.

2.4 INSULATED ROLLING SERVICE DOOR

2.5 Door Designation J A7.1.1

- A. Stormtite Insulated Rolling Service Doors: Overhead Door Corporation Model 625S.
 1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - a. Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.
 - b. Front slat fabricated of:
 - 1) 20 gauge galvanized steel.
 - c. Back slat fabricated of:
 - 1) 24 gauge galvanized steel.
 - d. Slat cavity filled with CFC-free foamed-in-place, polyurethane insulation.
 - 1) R-Value: 7.7, U-Value: 0.13.
 - 2) Sound Rating: STC-21.
 2. Performance:
 - a. Through Curtain Sound Rating: Sound Rating: STC-28 (STC-30+ with HZ noise generator) as per ASTM E 90.
 - b. Installed System Sound Rating: STC-21 as per ASTM E 90.
 - c. U-factor: 0.91 NFRC test report, maximum U-factor of no higher than 1.00.

- d. Air Infiltration: Meets ASHRAE 90.1 & IECC 2012/2015 C402.4.3 Air leakage <1.00 cfm/ft2.
3. Slats and Hood Finish:
 - a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
 - 1) Powder Coat:
 - (a) PowderGuard Premium powder coat color as selected by the Architect. Coordinate with color selections A5.1.1
4. Weatherseals:
 - a. Interior guide weatherseal.
 - b. Lintel weatherseal.
 - c. Air Infiltration Package, IECC 2012/2015 listed; product to meet C402.4.3 2012 Air leakage <1.00 cfm/ft2.
 - 1) Air infiltration perimeter seal package includes: guide cover, guide cap, dual brush exterior guide seal, 4 inch finned lintel brush seal and vinyl bottom seal.
5. Bottom Bar:
 - a. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
6. Guides: Three structural steel angles.
7. Brackets:
 - a. Galvanized steel to support counterbalance, curtain and hood.
8. Finish; Bottom Bar, Guides, Headplate and Brackets:
 - a. PowderGuard Premium powder coat in black color.
9. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
10. Hood: Provide with internal hood baffle weatherseal.
 - a. 24 gauge galvanized steel with intermediate supports as required.
11. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - a. Sensing Edge Protection:
 - 1) Electric sensing edge.
 - b. Operator Controls:
 - 1) Push-button and key operated control stations with open, close, and stop buttons.
 - 2) Controls for both interior and exterior location.
 - 3) Controls surface mounted.
 - c. Special Operation:
 - 1) Vehicle detector operation.
 - d. Motor Voltage: 115/230 single phase, 60 Hz.
12. Wind Load Design:
 - a. N/A Interior Door
13. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.
14. Locking:
 - a. Cylinder lock for electric operation with interlock switch.
15. Wall Mounting Condition:
 - a. Face-of-wall mounting.
 - b. Controls to be mounted only in room 198

16. Insulated Vision Lites: Provide with uniformly spaced openings.
 - a. Size: 3 inch by 5/8 inch (76 mm by 16 mm)
 - b. Size: 10 inch by 1 inch (254 mm by 25.4 mm)
 - c. Provide with dual wall polycarbonate lites.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.
- F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
- G. Install perimeter trim and closures.
- H. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

SECTION 08 33 20

ROLLING COUNTER DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Rolling Counter Doors, manually operated.

1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Support framing and framed opening.
- B. Section 08710 - Door Hardware: Product Requirements for cylinder core and keys.
- C. Section 09900 - Painting: Field applied finish.

1.3 REFERENCES

- A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- C. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- E. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

1.4 SUBMITTALS

- A. Submit under provisions of Division 01
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Details of construction and fabrication.
 - 4. Installation methods.

- C. Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.9 WARRANTY

- A. Warranty: Manufacturer's limited door warranty for 2 years for all parts and components.
- B. PowderGuard Finish.

1. PowderGuard Zinc Base Coat applied to guides, bottom bar, headplates plus PowderGuard Textured applied to curtain and top coat for guides, bottom bar, headplates: Manufacturer's limited Zinc Finish warranty for 4 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com. Or equal.
- A. Requests for substitutions will be considered in accordance with provisions of Section 01 25 13.

2.2 ROLLING STEEL COUNTER DOORS

- A. Anodized Aluminum Counter Doors: Overhead Door Corporation 652 Series.
 1. Wall Mounting Condition:
 - a. Face-of-wall mounting.
 2. Curtain: Interlocking slats, Type F-158 fabricated of anodized aluminum. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.
 3. Finish:
 - a. Anodized Finish:
 - 1) Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
 - 2) Powder coat:
 - (a) PowderGuard Premium powder coat, color as selected by the Architect. Refer to finish schedule
 4. Bottom Bar: Extruded aluminum tubular shape with astragal.
 5. Guides: Extruded aluminum.
 6. Brackets: Steel plate to support counterbalance, curtain and hood.
 7. Finish; Bottom Bar, Guides, Brackets:
 - a. Finish: Black powder coat finish.

8. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.
9. Hood: Provided with intermediate support brackets as required and fabricated of:
 - a. Galvanized primed steel.
10. Operation:
 - a. Electric Motor
11. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - a. Sensing Edge Protection:
 - 1) N/A.
 - 2) Electric sensing edge.
 - b. Operator Controls:
 - 1) Key operation with open, close, and stop controls.
 - 2) Controls for interior location.
 - 3) Top of controls flush mounted 42" AFF in compliance with CBC 11B 308.2.2
12. Locking:
 - a. Two point dead locks with mortise cylinder/s.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.
- F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
- G. Install perimeter trim and closures.

3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion

3.6 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

SECTION 08 36 00
SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glazed Aluminum Sectional Overhead Doors
- B. Operating Hardware, tracks, and support.

1.2 RELATED SECTIONS

- A. 04 22 00 - Concrete Unit Masonry: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.
- B. 05 50 00 - Metal Fabrications: Steel frame and supports.
- C. 07 92 00 - Joint Protection: Perimeter sealant and backup materials.
- D. 08 71 00 - Door Hardware: Cylinder locks.
- E. 09 91 00 - Painting - Interior and Exterior: Field painting.

1.3 REFERENCES

- A. [ANSI/DASMA 102](#) - American National Standard Specifications for Sectional Overhead Type Doors.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
 - 1. Design pressure of 20 lb/sq ft.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.
- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weathertight location.

1.8 PROJECT CONDITIONS

- A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: sales@overheaddoor.com.
- A. Substitutions: Provide per Section 01 25 13, "Substitution Procedures"

2.2 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

Door Type K A7.1.1

- A. Glazed Sectional Overhead Doors: 521 Series Aluminum Doors by Overhead Door Corporation.
 - 1. Door Assembly: Stile and rail assembly secured with 1/4 inch (6 mm) diameter through rods.
 - a. Panel Thickness: 1-3/4 inches (44 mm).
 - b. Center Stile Width: 2-11/16 inches (68 mm)
 - c. End Stile Width: 3-5/16 inches (84 mm)
 - d. Intermediate Rail Pair Width: 3-11/16 inches (94 mm).
 - e. Top Rail Width:
 - 1) 2-3/8 inches (60 mm).
 - f. Bottom Rail Width:
 - 1) 3-3/4 inches (95 mm).
 - g. Aluminum Panels: 0.050 inch (1.3 mm) thick, aluminum.
 - h. Stiles and Rails: 6063 - T6 aluminum.

- i. Springs:
 - 1) 50,000 cycles.
- j. Glazing:
 - 1) 1/4 inch tempered glazing to match GL-1 08 81 00.
- 2. Finish and Color:
 - a. Anodized Finish: Clear anodized.
- 3. Windload Design: Provide to meet the Design/Performance requirements specified.
- 4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- 5. Lock: Interior galvanized single unit.
- 6. Weatherstripping:
 - a. Flexible bulb-type strip at bottom section.
 - b. Flexible Jamb seals.
 - c. Flexible Header seal.
- 7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
- 8. Manual Operation: Chain hoist.
- 9. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
 - a. Entrapment Protection: Required for momentary contact, includes radio control operation.
 - 1) Electric sensing edge monitored to meet UL 325/2010.
 - b. Operator Controls:
 - 1) Push-button and key operated control stations with open, close, and stop buttons.
 - 2) Surface mounting.
 - 3) Interior location.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.

3.4 CLEANING AND ADJUSTING

- A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
- B. Clean doors, frames and glass.
- C. Remove temporary labels and visible markings.

3.5 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

SECTION 08 41 13
ALUMIMUM-FRAMED STOREFRONTS, ENTRANCES AND WINDOWS

PART 1 - GENERAL

1.1. SUMMARY

A. Section Includes:

1. Architectural Exterior Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units – including framed exterior fixed windows, where noted in plans
2. Architectural Interior Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, etc.
3. Aluminum framed entrance system.

1.2. RELATED SECTIONS:

- A. Section 05 40 00 - Cold-Formed Metal Framing
- B. Section 06 10 00 - Rough Carpentry
- C. Section 07 13 26 - Self-Adhering Sheet Waterproofing
- D. Section 07 21 00 - Thermal and Acoustical Insulation
- E. Section 07 25 00 - Weather Barriers
- F. Section 07 42 13 - Formed Metal Wall Panels
- G. Section 07 62 00 - Sheet Metal Flashing and Trim
- H. Section 07 92 00 - Joint Protection
- I. Section 08 81 00 - Glass Glazing
- J. Section 09 24 00, “Portland Cement Plaster”

1.3. REFERENCES (Current Edition for All Standards Listed)

A. American Architectural Manufacturer’s Association (AAMA):

1. AAMA 501.4 – Recommended Static Test Method For Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Inter-story Drifts
2. AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
3. AAMA 501.4 – Recommended Static Test Method For Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Inter-Story Drifts
4. AAMA 501.5 – Test Method for Thermal Cycling of Exterior Walls.

5. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
 6. AAMA 505 - Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure.
 7. AAMA 506 - Voluntary Specifications for Impact and Cycle Testing of Fenestration Products
 8. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
 9. AAMA Specification 701/702 – Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.
 10. AAMA Specification 1503 – Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
 11. AAMA Specification 1801 - Voluntary Specification for the Acoustical Rating of Exterior Windows, Doors, Skylights and Glazed Wall Sections
 12. AAMA - AFPA “Anodic Finishes/Painted Aluminum”.
 13. AAMA TIR-A8 – Structural Performance of Thermal Barrier Framing System
- B. American Society of Civil Engineers (ASCE):
1. ASCE 7, Section 6.5, "Method 2-Analytical Procedure"
- C. American Society for Testing and Materials (ASTM):
1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 2. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
 3. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
 4. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
 5. ASTM C1401 - Standard Guide for Structural Sealant Glazing
 6. ASTM C1184 - Standard Specification for Structural Silicone Sealants
 7. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 8. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 9. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
 10. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
 11. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

12. ASTM E1105 – Standard for Water Penetration
 13. ASTM E1425 - Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems
 14. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
 15. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
- D. National Fenestration Rating Council (NFRC):
1. NFRC 700 – Product Certification Program
 2. NFRC 705 – Component Modeling Approach Product Certification Program
- E. CCR, Title 24, 2018 ICC, With State of California Amendments – 2019 California Building Code (CBC), Part 2, Vols. 1 and 2
- F. CPSC 16 CFR 1201 – Safety Standard For Architectural Glazing Materials
- G. CSA-A440/A440.1 - Windows / User Selection Guide to CSA Standard A440-00, Windows
- H. GANA Glazing Manual.
- I. GSA-TS01 - US General Services Administration - Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loading.

1.4. SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed storefront system indicated.
1. Recycled Content:
 - a. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.
 - b. Once product has shipped, provide project specific recycled content information, including:
 - 1) Indicate recycled content; indicate percentage of pre- and post-consumer recycled content per unit of product.
 - 2) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - 3) Indicate location recovery of recycled content.
 - 4) Indicate location of manufacturing facility.
 2. Environmental Product Declaration (EPD):

- a. Include a Type III Product-Specific EPD created from a Product Category Rule.
3. Material Ingredient Reporting:
 - a. Include documentation for material reporting that has a complete list of chemical ingredients to at least 100 ppm (0.01%) that covers 100% of the product.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
- C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
- D. Samples For Verification: For aluminum-framed storefront system and components required.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.
- F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12" (304.8 mm) lengths of full-size components and showing details of the following:
 1. Joinery.
 2. Anchorage.
 3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.
- G. Other Action Submittals:
 1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
 2. See Section 08 71 00, "Door Hardware".

1.5. QUALITY ASSURANCE

- A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
- B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- C. Source Limitations: Obtain aluminum framed storefront system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum framed storefront system and are based on the specific system indicated. Refer to Section 01 60 00,"Product Requirements." Do not modify size and dimensional requirements.
 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.6. PRE-INSTALLATION CONFERENCE

- A. Conduct conference at Project site to comply with requirements in Section 01 31 00, " Project Management Coordination".

1.7. MOCKUPS – EXTERIOR STOREFRONT SYSTEM:

- A. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.
 - 2. Structural-Sealant Glazing: Comply with ASTM C1401, for design and installation of structural-sealant-glazed systems.
 - 3. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.
 - 4. Water leakage for glazed curtain wall mockups shall be tested in accordance with AAMA 501.2.

1.8. PERFORMANCE REQUIREMENTS – EXTERIOR STOREFRONT SYSTEM

- 3. Air Leakage: The test specimen shall be tested in accordance with ASTM E 283/E283M. Air Leakage rate shall not exceed 0.06 cfm/ft² (0.3 l/s · m²) at a static air pressure differential of 6.2 psf (300 Pa) with interior seal, or, rate shall not exceed 0.06 cfm/ft² (0.3 l/s · m²) at a static air pressure differential of 1.6 psf (75 Pa) without interior seal. CSA-A440/A440.1 Fixed Rating.
- 4. Water Resistance: The test specimen shall be tested in accordance with ASTM E331. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.
- 5. Uniform Load: A static air design load of 35 psf (1680 Pa) shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
- 6. Seismic: When tested to AAMA 501.4, system must meet design displacement of 0.010 x the story height and ultimate displacement of 1.5 x the design displacement.
- 7. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - a. Temperature Change (Range): 0 deg F (-18 deg C); 180 deg F (82 deg C).
 - b. Test Interior Ambient-Air Temperature: [75 deg F (24 deg C)].
 - c. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum 3 cycles.
- 8. Energy Efficiency:

- a. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
 - 1) Glass to Exterior – 0.47 (low-e)
 - 2) Glass to Center – 0.44 (low-e)
 - 3) Glass to Interior – 0.41 (low-e)
9. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
 - a. Glass to Exterior – 70_{frame} and 69_{glass} (low-e) Glass to Center – 62_{frame} and 68_{glass} (low-e)
 - c. Glass to Interior – 56_{frame} and 67_{glass} (low-e)
10. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
 - a. Glass to Exterior – 38 (STC) and 31 (OITC).
 - b. Glass to Center – 37 (STC) and 30 (OITC).
 - c. Glass to Interior – 38 (STC) and 30 (OITC).
11. Material Ingredient Reporting: Shall have a complete list of chemical ingredients to at least 100 ppm (0.01%) that covers 100% of the product, acceptable documentation includes:
 - a. Manufacturer's inventory with Chemical Abstract Service Registration Number (CASRN or CAS#).
 - 1) Kawneer's Material Transparency Summary (MTS), or equal.
 - b. Trifab 451T, Cradle to Cradle certification, or equal: Either document below is acceptable for this option.
 - 1) Cradle to Cradle Certified™ with Material Health section Silver or above.
 - 2) Silver level or above Material Health Certificate.
 - c. Red List Free DECLARE label.
- H. Environmental Product Declarations (EPD): Shall have a Type III Product-Specific EPD created from a Product Category Rule.

1.9. DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from

elements, construction activities, and other hazards before, during and after storefront installation.

1.10. PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of aluminum framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.11. WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials, fabrication or installation within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage through fixed glazing and framing areas.
 - f. Failure of operating components.
 - 2. Warranty period: Five years from date of Substantial Completion.

- B. Special Finish Warranty: Submit and provide with manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials, fabrication or installation within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty period: 10 years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, the following manufacturer shall be the Basis of Design, or equal.

Kawneer Company Inc.

Address: 555 Guthridge Ct. Technology Park/Atlanta Norcross, GA 30092

Website: <https://www.kawneer.com>

Architectural Sales Representative - Northern Calif. Kawneer

Craig Gauger

Phone: (916) 716-7396

E-mail: craig.gauger@arconic.com

B. Basis-of-Design Product - Kawneer Company Inc.:

a. Basis-of-Design Product:

1) Kawneer Company Inc.

a) Exterior:

(1) Trifab™ 451T (Thermal) Framing System

b) Interior:

(1) Trifab 450 Framing System

2) System Dimensions: 2" x 4-1/2" (50.8 mm x 114.3 mm)

3) Glass – Coordinate w/ A7.1.2

a) Exterior: Exterior 1" glazing

b) Interior: Center, 1/4" glazing UON refer to

2. Substitutions per Section 01 25 00, "Substitution Procedures".

2.2 MATERIALS – STOREFRONT SYSTEM:

A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B221: 6063-T6 alloy and temper.

1. Recycled Content: Shall have a minimum of 50% mixed pre- and post-consumer recycled content.

a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.

b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.

c. Indicate location recovery of recycled content.

d. Indicate location of manufacturing facility.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

- E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.
- G. Red List Free: Product does not contain PVC or Neoprene.

2.3 STOREFRONT FRAMING SYSTEM - EXTERIOR:

- A. Thermal Barrier – Kawneer, Trifab Versaglaze 451T, Thermally-Broken Storefront System, or approved equal.

Product Website Link:

https://www.kawneer.com/kawneer/north_america/en/product.asp?prod_id=1833&desc=thermal-aluminum-window-framing-system

1. Kawneer IsoLock Thermal Break, or equal, with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
2. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
Note: All storefronts shall be field tested according to AAMA 501.2 and shall not evidence water penetration.
3. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
4. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
5. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action

2.4 STOREFRONT FRAMING SYSTEM - INTERIOR:

- B. Thermal Barrier – Kawneer, Trifab Versaglaze 450, Non-Thermally-Broken Storefront System, or approved equal.

Product Website Link:

https://www.kawneer.com/kawneer/north_america/en/product.asp?prod_id=1831&desc=exterior-structural-aluminum-framing-systems

1. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
2. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 GLAZING SYSTEMS:

- A. Glazing: As specified in Section 08 81 00, "Glass & Glazing".

- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- A. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
 - 1. Sealants - See Section 07 62 00, "Joint Sealants".
 - 2. Structural Sealant – Minimum Standard: ASTM C1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
 - a. Color: Black
 - 3. Weatherseal Sealant: Provide ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - a. Color: Matching structural sealant.
 - 4. Glazed assemblies shall bear NFRC permanent and temporary labels or label certificates in accordance with NFRC 700 or 705. **Note: Default temporary labels are unacceptable for this project.**

2.6 ENTRANCE DOOR SYSTEMS

- A. Basis-of-Design Product:
 - 1. Kawneer Company Inc., or equal.
 - a. Entrance Doors: 500 Swing Door: wide stile, 1 ¾ inch depth, high traffic applications.
 - b. The door stile and rail face dimensions of the 500 entrance door will be as follows

Door	Vertical Stile	Top Rail	Bottom Rail
500	5" (127 mm)	6" (127 mm)	10" (166 mm)
 - c. Major portions of the door members to be 0.125" (3.2) nominal in thickness and glazing molding to be 0.05" (1.3) thick.
 - d. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
 - e. Provide adjustable glass jacks to help center the glass in the door opening.
- B. Entrance Door Hardware:
 - 1. As specified in Section 08 71 00, "Door Hardware."

- a. Steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely aluminum-framed entrance doors.

C. Weatherstripping:

1. Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
2. The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be Kawneer Sealair weathering, or equal, comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
3. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests).
4. Threshold: Extruded aluminum, one piece per door opening, with ribbed surface.

D. Door Materials

1. Aluminum Extrusions: Alloy and temper recommended by sliding aluminum-framed glass door manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090" wall thickness at any location for the main frame and sash members.
2. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with sliding aluminum-framed glass door members, trim hardware, anchors, and other components.
3. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
4. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
5. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

2.7 ACCESSORY MATERIALS:

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07 92 00, "Joint Protection
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint, containing no asbestos; formulated for 30 mil thickness per coat.

2.8 FABRICATION – STOREFRONT SYSTEM

- A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fit joints; make joints flush, hairline and weatherproof.

3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 4. Physical and thermal isolation of glazing from framing members.
 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 6. Provisions for field replacement of glazing.
 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- D. Storefront Framing: Fabricate components for assembly using manufactures standard installation instructions.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 FABRICATION – ENTRANCES:

- A. Fabricate aluminum-framed glass entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
- B. Fabricate aluminum-framed glass doors that are re-glazable without dismantling perimeter framing.
1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" (29 mm) long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
 2. Accurately fit and secure joints and corners. Make joints hairline in appearance.
 3. Prepare components with internal reinforcement for door hardware.
 4. Arrange fasteners and attachments to conceal from view.
- C. Weather Stripping: Provide weather stripping locked into extruded grooves in door panels or frames as indicated on manufactures drawings and details.
- D. Aluminum Finishes
1. Comply with AAMA-AFPA "Anodic Finishes/Painted Aluminum" for recommendations for applying and designating finishes.
 2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
 3. Factory Finishing:

- a. Kawneer Permanodic, or equal, AA-M10C22A31, AAMA 611, Architectural Class II Clear Anodic Coating (Color #17 Clear)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.
- B. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum framed storefront system, accessories, and other components.
- B. Install aluminum framed storefront system and entrances level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- D. Install aluminum framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within sliding door to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Field Tests – Exterior Storefront System:
 - 1. Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
 - a. Testing: Testing shall be performed by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements. Testing Standard per AAMA 503, including reference to ASTM E783 for Air Infiltration Test and ASTM E1105 Water Infiltration Test.
 - 1) Air Infiltration Tests: Conduct tests in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.

- 2) Water Infiltration Tests: Conduct tests in accordance with ASTM E1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf (300 Pa).
- b. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 62 00
UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Self-flashing unit skylights with integral curbs.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data: For each type of unit skylight.
2. Shop Drawings: For unit skylight work. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.
3. Samples: For each type of exposed finish required and each type of glazing.
4. Product Schedule: For unit skylights

B. Informational Submittals:

1. Qualification data.
2. Product test reports.
3. Field quality-control reports.
4. Sample warranty.

C. Closeout Submittals:

1. Maintenance data.

1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Kingspan Light and Air, Model 4848 ALIT SF 2 CPM/WPM MF 18" INS WN SSCRN-ATT, Acrylic – Quasar prismatic aluminum self-flashing insulated triarchy skylight, or approved equal, Substitutions per 01 25 13

1. Website Link: <http://www.bristolite.com/interfaces/Media/PDS-1017-AL.pdf>
2. Contact: John Botnacki, Northern California Regional Sales Manager. Phone - (916) 772-5608. E-mail - John.Botnacki@kingspan.com
3. Substitutions per Section 01 62 00, "Product Options".

2.2 UNIT SKYLIGHTS

- A. Unit Shape and Size: As indicated in plans.
- B. Polycarbonate Glazing: Thermoformable, extruded monolithic sheets, UV resistant, burglar-resistance rated according to UL 972, and with average impact strength of 12 to 16 ft-lb/in. of width when tested according to ASTM D 256, Test Method A (Izod).
 1. Double-Glazing Profile: Dome, 25 percent rise. Thicknesses: Not less than thicknesses required to exceed performance requirements
 - b. Inner Glazing Color: Colorless, transparent
 - c. Outer Glazing Color: White, translucent
 2. Self-Ignition Temperature: 650 deg F or more for plastic sheets in thickness indicated when tested according to ASTM D 1929.
 3. Smoke-Production Characteristics: Smoke-developed index of 450 or less when tested according to ASTM E84, and smoke density of 75 or less when tested according to ASTM D2843.
 4. Burning Characteristics: Tested according to ASTM D635. Class CC1, burning extent of 1 inch or less for nominal thickness of 0.060 inch or thickness indicated for use.
- B. Glazing Gaskets: Manufacturer's standard
- C. Integral Curb: Extruded-aluminum Extruded-Aluminum Shapes: ASTM B221.
 2. Height: 18 inches at high side
 3. Construction: Double wall.
 4. Insulation: Manufacturer's standard rigid
 - a. Exposed Insulation: Cover face of insulation exposed to interior of building with aluminum
- D. Condensation Control: Fabricate unit skylights with integral internal gutters and non-clogging weeps to collect and drain condensation to the exterior.
- E. Thermal Break: Fabricate unit skylights with thermal barrier separating exterior and interior metal framing.
- F. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened. Provide nonremovable fastener heads.

2.3 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare,

pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: Color shall match roof panel color – coordinate with Section 07 41 13, “Metal Roof Panels”

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate installation of unit skylight with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
- B. Comply with recommendations in AAMA 1607 and with manufacturer's written instructions for installing unit skylights.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. After completion of installation and nominal curing of sealant and glazing compounds but before installation of interior finishes, test for water leaks according to AAMA 501.2.
- C. Perform test for total area of each unit skylight.
- D. Work will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3 CLEANING

- A. Clean exposed unit skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions of Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following, but is not necessarily limited to:
 - 1. Door Hardware, including electric hardware.
 - 2. Storefront and Entrance door hardware.
 - 3. Gate Hardware.
 - 4. Digital keypad access control devices.
 - 5. Hold-open closers with smoke detectors.
 - 6. Wall or floor-mounted electromagnetic hold-open devices.
 - 7. Power supplies for electric hardware.
 - 8. Low-energy door operators plus sensors and actuators.
 - 9. Thresholds, gasketing and weather-stripping.
 - 10. Door silencers or mutes.
- C. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
 - 1. Division 8: Section - Steel Doors and Frames.
 - 2. Division 8: Section - Wood Doors.
 - 3. Division 8: Section - Aluminum Storefront
 - 4. Division 28: Section - Fire/Life-Safety Systems & Security Access Systems.

1.03 REFERENCES (USE DATE OF STANDARD IN EFFECT AS OF BID DATE.)

- A. 2019 California Building Code, CCR, Title 24.
- B. BHMA – Builders’ Hardware Manufacturers Association
- C. CCR – California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- D. DHI – Door and Hardware Institute

- E. NFPA - National Fire Protection Association.
 - 1. NFPA 80 - Fire Doors and Other Opening Protectives
 - 2. NFPA 105 - Smoke and Draft Control Door Assemblies

- F. UL - Underwriters Laboratories.
 - 1. UL 10C - Fire Tests of Door Assemblies
 - 2. UL 305 - Panic Hardware

G. WHI - Warnock Hersey Incorporated

H. SDI - Steel Door Institute

1.04 SUBMITTALS & SUBSTITUTIONS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Submit six (6) copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
 - 1. Include a Cover Sheet with;
 - a. Job Name, location, telephone number.
 - b. Architects name, location and telephone number.
 - c. Contractors name, location, telephone number and job number.
 - d. Suppliers name, location, telephone number and job number.
 - e. Hardware consultant's name, location and telephone number.
 - 2. Job Index information included;
 - a. Numerical door number index including; door number, hardware heading number and page number.
 - b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
 - c. Manufacturers' names and abbreviations for all materials.
 - d. Explanation of abbreviations, symbols, and codes used in the schedule.
 - e. Mounting locations for hardware.
 - f. Clarification statements or questions.
 - g. Catalog cuts and manufacturer's technical data and instructions.
 - 3. Vertical schedule format sample:

Heading Number 1 (Hardware group or set number – HW -1)

			(a) 1 Single Door #1 - Exterior from Corridor 101	(b) 90°	(c) RH
			(d) 3' 0"x7' 0" x 1-3/4" x (e) 20 Minute (f) WD x HM		
(g) 1	(h)	(i) ea	(j) Hinges - (k) 5BB1HW 4.5 x 4.5 NRP (l) 1/2 TMS	(m) 626	(n) IVE
2	6AA	1 ea	Lockset - ND50PD x RHO x RH x 10-025 x JTMS	626	SCH

(a) - Single or pair with opening number and location. (b) - Degree of opening (c) - Hand of door(s) (d) - Door and frame dimensions and door thickness. (e) - Label requirements if any. (f) - Door by frame material. (g) - (Optional) Hardware item line #. (h) - Keyset Symbol. (i) - Quantity. (j) - Product description. (k) - Product Number. (l) - Fastenings and other pertinent information. (m) - Hardware finish codes per ANSI A156.18. (n) - Manufacture abbreviation.

- D. Make substitution requests in accordance with Division 1. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.
- E. Wiring Diagrams: Provide product data and wiring and riser diagrams for all electrical products listed in the Hardware Schedule portion of this section.
- F. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- G. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- H. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.
- I. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.
- J. LEED Certification Points: Submit information and certifications necessary to achieve maximum points for LEED certification; coordinate and cooperate with Owner and Architect in providing information necessary for required LEED rating.

1.05 QUALITY ASSURANCE

- A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.

- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
1. Responsible for detailing, scheduling and ordering of finish hardware.
 2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
To maintain the integrity of patented key systems provide a letter of authorization from the specified manufacturer indicating that supplier has authorization to purchase the key system directly from the manufacturer.
 3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.
- C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
- E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.
- B. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.
- C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.
- D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.
- E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

- F. Product packaging to be labelled in compliance with CA Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986.

1.07 WARRANTY

- A. Provide warranties of respective manufacturers' regular terms of sale from day of final acceptance as follows:
1. Locksets: "L" Series (3) years – "ND" Ten (10) years.
 2. Electronic: One (1) year.
 3. Closers: Thirty (30) years --except electronic closers shall be two (2) years.
 4. Exit devices: Three (3) years.
 5. All other hardware: Two (2) years.

1.08 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.09 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference at least one week prior to beginning work of this section.
- B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key District Personnel, and Project Inspector.
- C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review District's keying standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

<u>Item</u>	<u>Manufacturer</u>	<u>Acceptable Substitutes</u>
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches & Cylinders	Schlage	Or Approved Equal
Exit Devices	Von Duprin	Or Approved Equal
Closers	LCN	Or Approved Equal
Push, Pulls & Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI

Dust Proof Strikes	Ives	Trimco, BBW, DCI
Coordinators	Ives	Trimco, BBW, DCI
Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

2.02 MATERIALS

- A. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.
1. Hinges shall be sized in accordance with the following:
 - a. Height:
 - 1) Doors up to 42" wide: 4-1/2" inches.
 - 2) Doors 43" to 48" wide: 5 inches.
 - b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
 - c. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
 2. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.
- B. Floor Closers: Shall be equipped with compression springs, cam and roller operating mechanism and a one piece spindle-cam for maximum operating performance and longevity.
- C. Pivots: High strength forgings and castings with precision bearings for smooth operation. Positive locking vertical adjustment mechanism to allow installer to precisely position the door and balance the load.
- D. Continuous Hinges: As manufactured by Ives, an Allegion Company. UL rated as required.
- E. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series as scheduled with "Rhodes" design, fastened with through-bolts and threaded chassis hubs.
1. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
 - a. Abusive Locked Lever Torque Test – minimum 3,100 inch-pounds without gaining access
 - b. Offset lever pull – minimum 1,600 foot pounds without gaining access
 - c. Vertical lever impact – minimum 100 impacts without gaining access
 2. Cycle life - tested to minimum 16 million cycles per ANSI/BHMA A156.2 Cycle Test with no visible lever sag or use of performance aids such as set screws or spacers
 3. UL 10C for 4'-0" x 10'-0" 3-hour fire door.

4. Cylinders: Refer to “KEYING” article, herein.
 5. Provide solid steel anti-rotation through bolts and posts to control excessive rotation of lever.
 6. Provide lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.
 7. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw capable of UL listing of 3 hours on a 4' x 10' opening. Provide proper latch throw for UL listing at pairs.
 8. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 9. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 10. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 11. Provide wired electrified options as scheduled in the hardware sets.
 - a. 12 through 24 volt DC operating capability, auto-detecting
 - b. Selectable EL (fail safe)/EU (fail secure) operating mode via switch on chassis
 - c. 0.230A (230mA) maximum current draw
 - d. 0.010A (10mA) holding current
 - e. Modular / “plug in” request to exit switch
 12. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides.
- F. Schlage “L” Series as scheduled with “06” Style Lever and “N” Style Escutcheon.
1. Locksets to comply with ANSI A156.13, Series 1000, Operational Grade 1 and Security Grade 1 with all standard trims. Locksets shall also comply with UL10C Positive Pressure requirements
 2. Lock case shall be manufactured with heavy 12 gauge steel with fully wrapped design. Lock cases with exposed edges are not acceptable. Lock case shall be multi-functional allowing transformation to a different function without opening lock case.
 3. Latchbolt shall have 3/4” throw and be non-handed, field reversible without opening the lock case. Solid latchbolts and / or plastic anti-friction devices are not acceptable.
 4. The deadbolt, when used, shall be 1” throw stainless steel with a 3/4” internal engagement when fully extended.
 5. All trim shall be through-bolted with the spring cages supporting the trim attached to the lock cases to prevent torqueing.
 6. Levers to have independent rotation in both directions. Exterior lever assembly to be one-piece design attached by threaded bushing. Interior lever assembly shall be attached by screwless shank
 7. Thru-bolt lever assemblies through the door for positive interlock. Locks using a through the door spindle for attachment are not acceptable. Spindles shall be independent, designed to “break-away” at a maximum of 75psi torque.
 8. Hand of lock chassis to be changeable by simply moving one screw from one side to the case to the other and pulling and reversing the latchbolt.
 9. Cylinders to be secured by a cast stainless steel, dual retainer. Locks utilizing screws and / or stamped retainers are not acceptable.
- G. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4” diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller.

Strike alloy deadbolt with reinforcer and two 3” long screws. ANSI A156.5, 2001 Grade 1 certified.

H. Exit devices: Von Duprin as scheduled.

1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2001 standards.
2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
3. Mechanism case shall have an average thickness of .140".
4. Compression spring engineering.
5. Non-handed basic device design with center case interchangeable with all functions.
6. All devices shall have quiet return fluid dampeners.
7. All latchbolts shall be deadlocking with ¾” throw and have a self-lubricating coating to reduce friction and wear.
8. Device shall bear UL label for fire and or panic as may be required.
9. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
10. Lever Trim: “Breakaway” design, forged brass or bronze escutcheon with a minimum of .130” thickness, match lockset lever design.
11. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key.
12. Furnish glass bead kits for vision lites where required.
13. All Exit Devices to be sex-bolted to the doors.
14. Panic Hardware shall comply with CBC Section 11B.404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
 - a. The unlatching force shall not exceed 15 lbs. applied in the direction of travel.
15. Hardware (including panic hardware) shall not be provided with “Night Latch” (NL) function for any accessible doors or gates unless the following conditions are met per DSA Interpretation 10-08 DSA/AC (External). Revised 4/28/09). Such conditions must be clearly demonstrated and indicated in the specification.
 - a. Such hardware has a ‘dogging’ feature.
 - b. It is dogged during the time the facility is open.
 - c. Such ‘dogging’ operation is performed only by employees as their job function (non-public use).

I. Closers: LCN as scheduled. Place closers inside building, stairs, room, etc.

1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 1 1/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16” steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel

main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.

4. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.
 5. Closers shall be installed to permit doors to swing 180 degrees.
 6. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.
 7. Provide the manufactures drop plates, brackets and spacers as required at narrow head rails and special frame conditions. NO wood plates or spacers will be allowed.
 8. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. Per 11B-404.2.8.1, door shall take at least 5 seconds to move from an open position of 90 degrees to a position of 12 degrees from the latch jamb.
- J. Flush Bolts & Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
1. Manual flush bolts only permitted on storage or mechanical openings as scheduled.
 2. Provide dust proof strikes at openings using bottom bolts.
- K. Door Stops:
1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).
 3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- L. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.
- M. Thresholds: As Scheduled and per details.
1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
 2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 "Thermal and Moisture Protection".

3. Use ¼” fasteners, red-head flat-head sleeve anchors (SS/FHSL).
 4. Thresholds shall comply with CBC Section 11B-404.2.5.
- N. Seals: Provide silicone gasket at all rated and exterior doors.
1. Fire-rated Doors, Resilient Seals: UL10C Classified complies with NFPA 80 & NFPA 252. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements.
 2. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C Classified complies with NFPA 80 & NFPA 252. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required.
 3. Smoke & Draft Control Doors, Provide UL10C Classified complies with NFPA 80 & NFPA 252 for use on “S” labeled Positive Pressure door assemblies.
- O. Door Shoes & Door Top Caps: Provide door shoes at all exterior wood doors and top caps at all exterior out-swing doors.
- P. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.03 KEYING

- A. Furnish all cylinders in the Patent Protected Schlage Small Format Interchangeable Core. (SFIC) “Everest B” family of keyways. Pack change keys independently (PKI)
1. For SFIC systems provide 80-035 Small Format Construction Cores in either “BRN” or “GRN” combination for all locks that need to be locked during construction and M204-152 Disposable Cores for all cylinders not required to be locked.
 2. For SFIC systems provide ten 48-310 Const. Keys in either “BRN” or “GRN” combination to match cores in # 1 above.
 3. For SFIC systems provide two 48-311 Control Keys in either “BRN” or “GRN” combination to match cores in # 1 above. (const.)
 4. For SFIC systems provide two control keys for installing the permanent cores (either 48-311 for non-patented keyways or 49-356 for patented keyways such as “Everest -B” family)
- B. Furnish all keys with visual key control.
1. Stamp key “Do Not Duplicate”.
 2. Stamp (BHMA) key symbol on key.
 3. Stamp unique owner identifier from the key bow.
- C. Furnish all cylinders with visual key control.
1. Stamp (BHMA) key symbol on side of cylinder (CKC).
 2. Stamp unique owner supplied code on cylinder side. (CKC) (6 character maximum).
- D. Furnish mechanical keys as follows:

1. Furnish 2 cut change keys for each different change key code.
 2. Furnish 1 uncut key blank for each change key code.
 3. Furnish 6 cut masterkeys for each different masterkey set.
 4. Furnish 3 uncut key blanks for each masterkey set.
 5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
 6. Furnish 1 cut control key cut to each SKD combination.
- E. Furnish Schlage Padlocks and the cylinders to tie them into the masterkey system for gates, storage boxes, utility valve security, roof hatches and roll-up doors keyed as directed in the keying schedule.
1. Furnish KS43D2200 padlock for use with non-I/C Schlage cylinders. Furnish 47-413 (conventional) or 47-743-XP (PrimusXP) with above.
 2. Furnish KS43G3200 padlock for use with FSIC Schlage cylinders. Furnish 23-030 (Classic / Everest) or 20-740 (PrimusXP) with above.
 3. Furnish KS41D1200 padlock for use with SFIC Schlage cylinders. Furnish 80-037 (Everest-B) with above.
- F. Furnish one Schlage cabinet lock for each cabinet door or drawer so designated on the drawings or keying schedule to match the masterkey system.
1. Furnish CL100PB for use with non-I/C Schlage cylinders.
 2. Furnish CL77R for use with FSIC Schlage cylinders.
 3. Furnish CL721G for use with SFIC Schlage cylinders.

2.04 FINISHES

- A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.
- B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.
- C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
- D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.05 FASTENERS

- A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
- B. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
- D. Provide expansion anchors for attaching hardware items to concrete or masonry.

- E. All exposed fasteners shall have a phillips head.
- F. Finish of exposed screws to match surface finish of hardware or other adjacent work.
- G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.
- C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer's furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2016 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will to be located between 34" and 44" AFF.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.
- G. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

- H. Hardware Installer shall coordinate with security contractor to route cable to connect electrified locks, panic hardware and fire exit hardware to power transfers or electric hinges at the time these items are installed so as to avoid disassembly and reinstallation of hardware.
- I. Hardware Installer shall also be present with the security contractor when the power is turned on for the testing of the electronic hardware applications. Installer shall make adjustments to solenoids, latches, vertical rods and closers to insure proper and secure operation.
- J. All wiring for electro-mechanical hardware mounted on the door shall be connected through the power transfer and terminated in the interface junction box specified for in the Electrical Section.
- K. Conductors shall be minimum 18 gage stranded, multicolored. A minimum 12 in. loop of conductors shall be coiled in the interface junction box. Each conductor shall be permanently marked with its function.
- L. If a power supply is specified in the hardware sets, all conductors shall be terminated in the power supply. Make all connections required for proper operation between the power supply and the electro-mechanical hardware. Provide the proper size conductors as specified in the manufacturer's technical documentation.

3.03 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surface soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.04 HARDWARE LOCATIONS

- A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.05 FIELD QUALITY CONTROL

- A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers' instructions and as specified herein.

3.06 SCHEDULE

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.
- C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Manufacturers Abbreviations (Mfr.)

ADA	=	Adams Rite Mfg.	Aluminum Door Hardware
GLY	=	Glynn-Johnson Corporation	Overhead Door Stops
IVE	=	Ives	Hinges, Pivots, Bolts, Coordinators, Dust Proof Strikes, Push Pull & Kick Plates, Door Stops & Silencers
JOH	=	L.E. Johnson	Sliding Door Hardware
LCN	=	LCN	Door Closers
SCE	=	Schlage Electronics	Electronic Door Components
SCH	=	Schlage Lock Company	Locks, Latches & Cylinders
TRI	=	Trimco	Signs
VON	=	Von Duprin	Exit Devices
ZER	=	Zero International	Thresholds, Gasketing & Weather-stripping

HARDWARE GROUP NO. 01

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL CLASSROOM SEC	ND95BD RHO XN12-035	626	SCH
2	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	PER DETAIL	AL	ZER

HARDWARE GROUP NO. 02

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-NL	626	VON
1	EA	SFIC MORTISE CYL.	80-132 XQ11-948	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC	630	VON
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER
1	EA	MULTITECH READER	MTK15 12 VDC	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC		VON

HARDWARE GROUP NO. 03

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE	51003FP 12/24 VAC/VDC	689	VON
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER
1	EA	MULTITECH READER	MTK15 12 VDC	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC		VON

HARDWARE GROUP NO. 04

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224XY	628	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-NL	626	VON
1	EA	SFIC MORTISE CYL.	80-132 XQ11-948	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC	630	VON
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	PER DETAIL	AL	ZER
1	EA	MULTITECH READER	MTK15 12 VDC	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC		VON
1		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

HARDWARE GROUP NO. 05

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-NL	626	VON
1	EA	SFIC MORTISE CYL.	80-132 XQ11-948	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC	630	VON
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER
1	EA	MULTITECH READER	MTK15 12 VDC	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC		VON

HARDWARE GROUP NO. 06

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	224HD EPT	628	IVE
2	EA	CONT. HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	QELX-PA-AX-99-EO	626	VON
1	EA	ELEC PANIC HARDWARE	QELX-PA-AX-99-EO W/CYL HOLE-990	626	VON
1	EA	SFIC MORTISE CYL.	80-132	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
2	EA	90 DEG OFFSET PULL	8190HD 12" O	630	IVE
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER
1	EA	MULTITECH READER	MTK15 12 VDC	BLK	SCE
1			POWER SUPPLY - WORK OF DIVISION 28		
1			WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

HARDWARE GROUP NO. 07

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
5	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 TW8	630	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE	51003FP 12/24 VAC/VDC	689	VON
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	ASTRAGAL	43SP	SP	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER
1	EA	MULTITECH READER	MTK15 12 VDC	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC		VON

HARDWARE GROUP NO. 08

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	ASTRAGAL	43SP	SP	ZER
1	EA	THRESHOLD	PER DETAIL	AL	ZER

HARDWARE GROUP NO. 09

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	VANDL CLASSROOM SEC	ND95BD RHO XN12-035	626	SCH
2	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	DOOR SWEEP	153A	A	ZER
1	EA	THRESHOLD	PER DETAIL	AL	ZER

HARDWARE GROUP NO. 10

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	VANDL CLASSROOM SEC	ND95BD RHO XN12-035	626	SCH
2	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	DOOR BOTTOM	355AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER

HARDWARE GROUP NO. 11

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	VANDL CLASSROOM SEC	ND95BD RHO XN12-035	626	SCH
2	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	328AA-S	AA	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER

HARDWARE GROUP NO. 12

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	VANDL OFFICE LOCK	ND91BD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	328AA-S	AA	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER

HARDWARE GROUP NO. 13

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	VANDL OFFICE LOCK	ND91BD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	GASKETING	328AA-S	AA	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER

HARDWARE GROUP NO. 14

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY W/ INDICATOR	L9056BD 06N L583-363 L283-722	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER

HARDWARE GROUP NO. 15

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	PA-AX-99-L-BE-06	626	VON
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER

HARDWARE GROUP NO. 16

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	PA-AX-99-L-06	626	VON
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER

HARDWARE GROUP NO. 17

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-NL	626	VON
1	EA	SFIC MORTISE CYL.	80-132 XQ11-948	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	328AA-S	AA	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER

HARDWARE GROUP NO. 18

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	VANDL CLASSROOM SEC	ND95BD RHO XN12-035	626	SCH
2	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT)	695	LCN
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	ASTRAGAL	43SP	SP	ZER

MAGNETIC HOLDER TIED TO FIRE ALARM SYSTEM

HARDWARE GROUP NO. 19

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	VANDL CLASSROOM SEC	ND95BD RHO XN12-035	626	SCH
2	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	ASTRAGAL	43SP	SP	ZER

HARDWARE GROUP NO. 20

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL CLASSROOM SEC	ND95BD RHO XN12-035	626	SCH
2	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	328AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	ASTRAGAL	43SP	SP	ZER
1	EA	THRESHOLD	566A-223	A	ZER

HARDWARE GROUP NO. 21

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	VANDL CLASSROOM SEC	ND95BD RHO XN12-035	626	SCH
2	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	MEETING STILE	44STST	STST	ZER

HARDWARE GROUP NO. 22

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-NL	626	VON
1	EA	PANIC HARDWARE	PA-AX-99-EO	626	VON
1	EA	SFIC MORTISE CYL.	80-132	626	SCH
1	EA	SFIC MORTISE CYL.	80-132 XQ11-948	626	SCH
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
1	EA	GASKETING	328AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	566A-223	A	ZER

HARDWARE GROUP NO. 23

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	OH STOP	90S	630	GLY
2	EA	SURFACE CLOSER	4040XP	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	328AA-S	AA	ZER
2	EA	DOOR SWEEP	253A	A	ZER
1	EA	MEETING STILE	44STST	STST	ZER
1	EA	THRESHOLD	566A-223	A	ZER

HARDWARE GROUP NO. 24

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	OH STOP	90S	630	GLY
2	EA	SURFACE CLOSER	4040XP	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER
2	EA	DOOR SWEEP	253A	A	ZER

HARDWARE GROUP NO. 25

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224XY	628	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	ELECTRIC STRIKE	51003FP 12/24 VAC/VDC	689	VON
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	MULTITECH READER	MTK15 12 VDC	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC		VON

HARDWARE GROUP NO. 26

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER

HARDWARE GROUP NO. 27

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER

HARDWARE GROUP NO. 28

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER

HARDWARE GROUP NO. 29

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND81BD RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	GASKETING	188SBK PSA ZAG	BK	ZER

HARDWARE GROUP NO. 30

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1			HARDWARE BY ROLL UP DOOR MANUFACTURER		

END OF SECTION

**SECTION 08 81 00
GLASS GLAZING**

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Glass and glazing for windows and doors.

1.2. REFERENCES

- A. ASTM C-1036 - Standard Specification for Flat Glass.
- B. ASTM C- 1048 - Standard Specification for Heat-Treated Flat Glass - Kind FT Coated and Uncoated Glass.
- C. Glass Association of North America (GANA) (formerly FGMA) - Glazing Manual.
- D. Title 24, Part 2, Chapter 24, current edition.

1.3. QUALITY ASSURANCE

- A. Conform to GANA Glazing Manual for glazing installation methods.
- B. Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- C. Staff:
 - 1. Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.
 - 2. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.4. SUBMITTALS

- A. Submit in accordance with the provisions of Section 01 33 00.
- B. Materials List: Provide complete list of all proposed materials and accessories, including product data on performance criteria.
- C. Samples: Accompanying materials list, submit three 12 inch square samples of each glass type. Grind and seal all edges.
- D. Shop Drawings: Provide complete shop drawings indicating glass type, installation method, and materials used.

1.5. DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to site under provisions of the General Conditions.
- B. Store and protect products under provisions of the General Conditions.

1.6. WARRANTY

- A. Warranty:

1. Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:
 - a. Broken, cracked or otherwise damaged glass not resulting from vandalism.
 - b. Water intrusion through sealant/glass joint.
 - c. Sealant failure.
 - d. Fogging or delamination at laminated glass.
- B. *Insulating Glass Warranty:*
 1. *Provide, in Architect approved form, the Owner with manufacturers warranty against the following specific defects or failures for a period of ten (10) years after Notice of Substantial Completion:*
 - a. *No material obstruction of vision through glass caused by accumulation of dust, moisture or film on the internal surface of glass caused by insulating seal failure.*
 - b. *Water intrusion through sealant/glass joint.*

PART 2 - PRODUCTS

1.1. MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

1.2. INSULATING GLASS UNIT, FULLY TEMPERED – GL-1

- A. Fabricator: Fabricator:
 1. Vitro certified fabricator.
 2. Accepted fabricator - Oldcastle Glass, www.OldcastleGlass.com, or equal.
- B. Series/Type: Dual glazed glass units, fully tempered,
 1. Exterior Lite: 1/4-inch Virto Azuria.
 2. Interior Lite: 1 / 4 inch Vitro Solarblue on Surface 3.

1.3. TEMPERED VISION GLASS – SINGLE LITE - GL-2

- A. Manufacturer: Vitro, www.vitro.com, or equal.
- B. Product Representative -
 - a. *Architectural Services Representative*
 - b. **Cassie Sciulli**
 - c. Glass Technology Center - 400 Guys Run Road, Cheswick, PA 15024
 - d. T: 412-820-8073
 - e. csciulli@vitro.com

C. Vitroglazings.com | 1-855-VTRO-GLS

D. Type:

1. Type: Clear, single vision, fully tempered, float glass.

E. Characteristics:

1. Total Thickness: 1/4 inch minimum, and as required by code.
2. Characteristics: Type 3 Clear
 - a. Strength: Fully Tempered (Kind FT) per ASTM C 1048 and ASTM C 1036. Permanently label all tempered glass.
 - b. Type: Condition A - uncoated, Type 1 - transparent, Class 1 - clear, q3 quality - glazing select, float glass.
 - c. Light Transmission: 89% visible light.
 - d. Shading Coefficient: 0.94.
 - e. Safety Standards: Comply with Chapter 24, Part 2, Title 24, CCR safety glazing requirements.

1.4. FIRE RATED GLASS – GL-3

A. Manufacturer: SAFTIFirst, www.safti.com, or equal.

B. Type: Clear ceramic, laminated, fire rated glazing.

C. Series: PYRAN Platinum L.

D. Characteristics:

1. Total Thickness: 3/8 inch.
2. Fire Rating: WHI or UL Classified as to fire resistance only. Refer to drawings for locations. Fire rated glass shall be permanently labeled.
3. Type: Clear (amber tint free), laminated, non-wire glass ceramic.
4. Frames: Provide fire rated frames as required by listing.

Safety Rating: Comply with Chapter 24, Part 2, Title 24, CCR impact safety glazing requirements

1.6 INSULATING GLASS UNIT GL – 4.

E. Total Thickness: One inch, and as required by code, with 1/2 inch air space.

1. Exterior Lite: 1/4-inch Virto Azuria.
2. Interior Lite: 1/4 inch Vitro Clear. ICD Opaci-coat #6-1495, Azuria Sky.

F. Characteristics:

1. Strength: Each lite fully Tempered (Kind FT) per ASTM C 1048 and ASTM C 1036. Permanently label all tempered glass.
2. SHGC: 0.22.
3. Visible Light Transmission: 24 percent.

4. Shading Coefficient: 0.25.
5. U-value – Summer Daytime: 0.26.
6. U-value – Winter Night: 0.28.
7. Safety Standards: Comply with CBC Chapter 24, safety glazing requirements.
8. Seal Classification: Class CBA per ASTM E 773/774, with third party validation required.

G. Accessories:

1. Capillary Tubes: Provide capillary tubes at units as recommended by manufacturer for installed altitude conditions.

1.5. GLASS DESIGN CRITERIA

- A. Provide glass thickness, edge support, "bite," and other engineering criteria per referenced standards *and Chapter 24, Title 24, Part 2, CCR*.
- B. Provide glass that has been produced, fabricated, and installed to withstand normal thermal movement and wind loading, without failure, including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.
 1. Normal thermal movement is defined as that resulting from a consequent temperature range of +10 degrees F to +180 degrees F within glass and glass framing members.
- C. Provide glass thickness in minimum thickness specified and as required *to meet* the following criteria (also see SheetS1.1.1) -
 1. Wind Speed: 136 MPH wind speed, (3 second gust)
 2. Exposure: Category C.
- D. Provide safety glazing complying with at all locations as required by Section *2406, Part 2, Volume 2, Title 24*.
 1. Provide permanent etched or ceramic fired label on all safety glazing, visible after installation.

1.6. GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene or EPDM with a Shore A Durometer value of 85 +_ 5.
- B. Spacer Shims: Neoprene with a Shore A Durometer value of 50.
- C. Foam Glazing Tapes / Beads: Provide manufacturers recommended system, UV Stabilized, black color.
- D. *Glazing putty/sealant: Provide DOW or equal, Series 795 structural silicone sealant for repair of existing window system glazing. Color as selected by Architect from standard color line.*

1.7. GLAZING FILM

- A. *Manufacturer: Madico, www.madico.com or equal.*
- B. *Type: Energy control film, pressure sensitive.*
- C. *Series: Sunscape Select, SB-35.*
- D. *Characteristics:*
 1. *Total Solar Energy Transmitted: 35 percent*

2. *Visible Light Transmitted: 41 percent*
 3. *Shading Coefficient: 0.52 minimum*
 4. *Solar Heat Gain Coefficient: 0.45*
 5. *Ultraviolet Light Transmitted: 0.-4.0%*
- E. *Color: Soft Bronze*
- F. *Application: Interior surface of existing exterior patient room windows*

1.8. OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

1.1. SURFACE CONDITIONS

- A. Inspection
1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify surfaces of glazing channels or recesses are clean and free of obstructions.
 - b. *Verify insulating glass unit sealant is compatible with window system glazing methods specified in Section 08520.*
 3. In the event of discrepancy, immediately notify the Architect.
 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.2. GLASS INSTALLATION

- A. General
1. Install all glass at proper ambient temperatures.
 2. Do not glaze assemblies when damp or wet due to rain, dew, condensation, or other moisture sources.
 3. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners.
 4. Do not impact glass with metal framing.
 5. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar.
 6. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening.
 7. Remove from project and dispose of glass units with edge damage or other imperfections of the type that, when installed, weaken glass and impair performance and appearance.

8. Install all glass within ambient temperature limits established by glass manufacturer.
 9. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- B. Install all glass products in accordance with referenced codes, standards, and approved submittals. Install per recommendations of manufacturer, and as specified in related sections.
- C. Install in accordance with Listing and labeling requirements.
1. Install wire glass with mesh pattern aligned vertically and horizontally.
- D. Rest glass on setting blocks per referenced standard.
1. Install neoprene or EPDM setting blocks. No lead setting blocks permitted.
 2. Provide minimum 4 inch long setting block, and as required by glass manufacturer. Install at quarter points unless otherwise approved.
 3. Provide setting block width 1/16 to 1/8 inch less than the width of the glazing pocket, and a minimum of 1/8 inch wider than glass thickness.
 4. Provide edge blocking at all jamb conditions of captured pocket glazing.
- E. Repair of existing glazing system.
1. Where shown on drawings, repair existing glazing assemblies.
 2. Remove all existing putty or sealant by approved means, providing satisfactory surface for sealant installation.
 3. Install glass on approved setting blocks with specified sealant. Install in accordance with sealant manufacturers recommendations.
- F. Glazing Film installation:
1. Apply glazing film to all glass within Room CR08 and at all other locations shown on drawings.
 2. Cut film sharply and without gaps, waves, or tears to fit tight against frame.
 3. Apply without wrinkles, bubbles, or gaps at edges.

1.3. PROTECTION AND CLEANING

- A. Protect glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply tape or marking of any kind to glass surface. Remove non-code required and non-permanent labels.
- B. Remove tape after work is completed.
- C. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.
- D. Examine glass surfaces adjacent to or below exterior plaster, concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer. Remove tape after work is completed.
- E. Do not store materials or any kind against interior or exterior surfaces of glass or glass frame. Remove tape after work is completed.
- F. Immediately prior to completion of the Work, clean all glass using manufacturers approved methods.

1.4. REPLACEMENT

- A. Immediately remove all glass delivered to site with manufacturing or fabrication defects.
- B. Remove and replace all glass broken, cracked, abraded or damaged in any other way during construction period due to construction, vandalism, natural occurrences or other causes.

END OF SECTION

SECTION 08 90 00
LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fixed formed-metal louvers.
- B. Related Requirements:
 - 1. Section 05 40 00 - Cold-Formed Metal Framing
 - 2. Section 07 13 26 - Self-Adhering Sheet Waterproofing.
 - 3. Section 07 25 00 - Weather Barriers.
 - 4.
 - 5. Work may be required to be coordinated with other sections.

1.2 SUBMITTALS

- A. Product Data: For each type of product per the requirements in Section 01 33 00.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories: Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.

1.3 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture of AMCA certified louvers with three years minimum experience.

1.4 WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

2.2 FIXED FORMED-METAL LOUVERS

A. Horizontal Drainable-Blade Louver:

1. Basis-of-Design: Subject to compliance with requirements, provide products equal to the following, or equal:
 - a. Ruskin Company, Model L375D, steel, 4" deep, drainable, or eq. Phone - (916) 381-6666. Website Link: <http://www.ruskin.com/model/l375d>
 - b. Wonder Metals, Model SDL-4, steel, 4" deep, drainable, or eq. Phone - 800 336-5877. Website Link: https://my.amca.org/members/documents/catalogs/14070_Approved%20Catalogs_WMC%20Model%20SDL-4%20fixed%20drainable%20blade%20louver%202011%20performance%20catalog%20April%202011_2011_06_29.pdf
2. Substitutions per Section 01 62 00, "Product Options"
3. Materials:
 - a. Louver Depth: 4 inches.
 - b. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, not less than 16 ga. for frames and 16 ga. for blades.
 - c. Mullion Type, If Applies: Exposed.
 - d. Louver Performance Ratings:
 - 1) Free Area: Not less than 50% for 48-inch- wide by 48-inch- high louver.
 - 2) Point of Beginning Water Penetration: Not less than.
 - 3) Air Performance: Not more than 0.10-inch wg static pressure drop at 700-fpm free-area intake velocity.
 - e. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.3 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 1. Screen Location for Fixed Louvers: Interior face.
 2. Screening Type: Bird screening Insect screening – 1/8" max. opening size due to Wildland Urban Interface Zone Restrictions.
- B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.
- C. Louver Screening for Galvanized-Steel Louvers:
 1. Bird Screening: Galvanized steel, 1/2-inch- square mesh, 0.041-inch wire.
 2. Insect Screening: Galvanized steel, 18-by-14 mesh, 0.011-inch wire.

2.4 MATERIALS

- A. Galvanized-Steel Sheet: ASTM A 653/A 653M, G60 zinc coating, mill phosphatized.
- B. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 3. For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless-steel fasteners.
 4. For fastening stainless steel, use 300 series stainless-steel fasteners.
 5. For color-finished louvers, use fasteners with heads that match color of louvers.
- C. Post-installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E 488/E 488M conducted by a qualified testing agency.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 FABRICATION

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.
1. .

2.6 GALVANIZED-STEEL SHEET FINISHES

- A. Finish louvers after assembly.
- B. Surface Preparation: Clean surfaces with nonpetroleum solvent, so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair according to ASTM A 780/A 780M.
- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 2 mils .
1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

- D. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

- A. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Gypsum board.
 - 1. Joint treatment and surface finishes.
 - 2. Accessories.

1.2 RELATED SECTIONS

- A. Section 05 40 00 - Cold-Formed Metal Framing
- B. Section 06 10 00 - Rough Carpentry
- C. Section 06 16 43 - Exterior Gypsum Sheathing
- D. Section 07 13 26 - Self-Adhering Sheet Waterproofing
- E. Section 07 21 00 - Thermal and Acoustical Insulation
- F. Section 07 25 00 - Weather Barriers
- G. Section 07 92 00 – Joint Protection
- H. Section 08 11 13 - Hollow Metal Doors and Frames
- I. Section 08 31 13 - Access Doors and Frames.
- J. Section 09 30 13 - Ceramic Tiling
- K. Section 09 78 26 - Fiberglass Reinforced Wall Panels (FRP)
- L. Section 09 91 00 - Painting - Interior and Exterior
- M. Section 10 28 13 - Toilet Accessories
- N. Section 10 44 13 – Fire Protection Specialties
- O. Work may be required to be coordinated with other sections

1.3 REFERENCES

- A. ASTM C514-04- Standard Specification for Nails for the Application of Gypsum Board
- B. ASTM C 645 – Standard Specification for Nonstructural Steel Framing Members
- C. ASTM C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
- D. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board
- E. ASTM C955 – Standard Specification for Cold-Formed Steel Structural Framing Members
- F. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

- G. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
- H. ASTM C1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
- I. ASTM C1396/C1396M - Standard Specification for Gypsum Board
- J. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- K. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
- L. Gypsum Association GA-214 – “Recommended Levels of Finish for Gypsum Board, Glass Mat & Fiber-Reinforced Gypsum Panels”
- M. Gypsum Association GA-216 - Application and Finishing of Gypsum Board Products.
- N. Conform to CBC Chapter 7 / CBC Chapter 7A, Part 2, Title 24, CCR for fire rated assemblies.
- O. Conform to CBC Chapter 25 / CBC Chapter 25A, Part 2, Title 24, CCR for finish materials installation.
- P. Conform to DSA Interpretation of Regulations document IR 25-3.13 for gypsum board ceiling suspension.

1.4 SUBMITTALS

- A. Provide submittals under provisions per Section 01 33 00, “Submittal Procedures”.
- B. Submit product data indicating materials, joint toppings, joint tape, and finish materials, and accessories.
- C. Submit 2' x 2' sample of machine applied drywall texture finish.
- D. Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Provide company who has produced the specified products for a period of 5 years prior to beginning work of this Section and maintains the capability to provide the specified products in compliance with the delivery and quantity criteria for the Project.
- B. Installer: For installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this Section, and who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Building Temperature and Ventilation: Do not install wallboard and joint compounds if building temperature is below 55 degrees F and proper ventilation is not provided to eliminate excessive moisture from building.

1.7 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver: All materials shall be delivered in original packages or bundles with the manufacturer's labels intact and legible.
- B. Handling and Storage: Materials shall be kept dry, stacked off the ground and properly supported and protected from weather. Protect all edges and surfaces. Stack wallboard flat.
- C. Protect work in progress as well as work of other trades. Clean surfaces that have been spotted during wallboard application.
- D. Contractor shall remove and reinstall all existing conduit, wiremold, light fixtures, fire alarm devices, etc. as required to perform work as listed in this specification. Suspend all wiring as required during work where equipment cannot be disconnected.

1.9 MOCKUPS/TEST INSTALLATIONS

- A. Provide minimum 8'-0" x 8'-0" in place wall texture mock-up for Architect approval of texture.
- B. Mock up portion can remain for inclusion in final work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance.
 - 1. United States Gypsum Co., USG. Phone - (800) 874-4968
 - 2. Georgia Pacific Building Products – Phone - (800) 225-6119
- B. Alternate: National Gypsum Company – Phone (704) 365-7300
- C. Substitutions per Section 01 25 00, “Substitution Procedures”.

2.2 GYPSUM BOARD

- A. Board Type:
 - 1. Non-Rated Gypsum Board:
 - a. Equal to USG, Sheetrock® Brand, “Regular” Gypsum Board, per ASTM C1396.
 - 1) Thickness: 5/8 inch.
 - 2) Facing: Paper.
 - 3) Edge: Tapered.
 - 4) Website Link: <https://www.usg.com/content/usgcom/en/products/walls/dry-wall/drywall-panels/regular-panels/sheetrock-gypsum-panels.141010.html>

2. Rated Gypsum Board:
 - a. Equal to USG, Sheetrock® Brand, “Type X, Fire-Rated” Gypsum Board, per ASTM C1396.
 - 1) Thickness: 5/8 inch.
 - 2) Facing: Paper.
 - 3) Edge: Tapered.
 - 4) Website Link: <https://www.usg.com/content/usgcom/en/products/walls/dry-wall/drywall-panels/fire-resistant-panels/sheetrock-firecode-x-gypsum-panels.142220.html>
3. Acoustic Gypsum Board
 - a. Equal to Pabco Gypsum Quietrock 530
 - 1) Thickness: 5/8 inch.
 - 2) Facing: Paper.
 - 3) Edge: Tapered.
 - 4) Website Link: <https://www.quietrock.com/products/quietrock-530>
4. Moisture and Mold-Resistant Gypsum Board
 - a. Provide on entire wall where moisture will be present such as toilet rooms, janitor rooms, kitchens, behind new ceramic wall tile and other areas where water will be present. Also provide within 5 feet of all sinks and drinking fountains. Impact-resistant for use in corridors:
 - b. Equal to USG, Sheetrock® Brand, Mold Tough Fire Code Core, Type X, per ASTM C473, ASTM D3273, ASTM C1396 and ASTM C630.
 - 1) Thickness: 5/8 inch.
 - 2) Facing: Fiberglass.
 - 3) Edge: Tapered and Wrapped Edges.
 - 4) Website Link: <https://www.usg.com/content/usgcom/en/products/walls/drywall/drywall-panels/fire-resistant-panels/sheetrock-firecode-x-gypsum-panels.142220.html>
 - c. Acceptable Alternate: Georgia Pacific Building Products, “Dens Armor Plus High Performance” Gypsum Board, per ASTM C1396.
 - 1) Thickness: 1/2 inch.
 - 2) Facing: Fiberglass.
 - 3) Edge: Tapered.
 - 4) Website Link: <https://www.usg.com/content/usgcom/en/products/walls/drywall/drywall-panels/regular-panels/sheetrock-gypsum-panels.141010.html>
5. Mold and Abuse-Resistant Gypsum Board
 - a. Impact-resistant for use in corridors:

- b. Equal to USG, Sheetrock® Brand, VHI Abuse-Resistant FireCode Core (Type X) per ASTM C36.
 - 1) Edge: SW Tapered.
 - 2) Thickness: 5/8 inch.
 - 3) per ASTM ASTM C36

Website Link: <https://www.usg.com/content/usgcom/en/products/walls/drywall/drywall-panels/abuse-resistant-panels/sheetrock-mold-tough-vhi-firecode-x-panels.143014.html>

Exterior Wall Gypsum Sheathing – See Section 06 16 43, “Exterior Gypsum Sheathing”

2.3 ACCESSORIES

A. Acoustic Assembly as defined by **a** on A2.6.1 and noted on plans

1. Acoustiblok acoustic membrane, or equal. Install per manufactures instructions.
 - a. Website-<https://www.acoustiblok.com/acoustiblok-product-lines/acoustiblok-soundproofing-material/>
 - (1) Single layer of Acoustiblok on one side of the framed wall partition. Where the framed wall partition would include a shear layer of plywood, the Acoustiblok recommendation would not be applicable.
2. Acoustic Sealant: All wall penetrations for electrical, mechanical, or plumbing should be completely sealed. Use quietseal or equal. Install per manufactures instructions.
 - a. Website- <https://www.quietrock.com/products/quietseal-pro>
3. Penetrations: All electrical boxes for outlets, switches, etc. should include putty-packs behind the electrical box to prevent acoustical leaks through the penetration. Use quietputty or equal.
 - a. Website- <https://www.quietrock.com/products/quietputty>

B. Drywall Joint and Edge Accessories:

1. Corner Bead: USG or approved alternate, paper faced metal.
2. Edge Trim: USG GA 216; Type "J" bead. or approved alternate, paper faced metal.
3. Expansion Joint: USG 093 or approved alternate, metal.
4. Drywall Reveal: Fry, DRM Series, reveal dimension as shown on drawings.

C. Joint and Finishing Systems:

1. Provide systems produced by same manufacturer as boards.
2. Joint Materials: GA 216; reinforcing tape, joint compound, adhesive, water, and fasteners.
3. Joint Systems: USG Ready Mixed Compounds, complying with ASTM C475, vinyl based, certified asbestos free.
4. Finishing System Materials: USG Multi-Purpose or approved alternate, complying with ASTM C475, non-aggregate, vinyl based, certified asbestos free.
5. Primer: Manufacturer's approved primer, compatible with finishes specified in other Sections.

D. Fasteners:

1. Gypsum Board Screws: Self-drilling, self-tapping steel screws.
 - a. For steel framing less than 0.03 inch thick: Comply with ASTM C1002.
 - b. For steel framing from 0.033 inch thick to 0.112 inch thick: Comply with ASTM C954.
 - c. Per GA 216 provide:
 - 1) Type S at light gauge steel,
 - 2) Type S-12 at heavy gauge steel (20 gauge and heavier steel framing, but not more than 12 gauge)
 - 3) Type W at wood framing,
 - 4) Type G screws at gypsum panel to gypsum panel
 - d. Not less than 1-1/4" long at 5/8" sheathing thickness per Table 1, GA 253.

E. Adhesive: Manufacturer's approved adhesive for attachment to concrete surfaces.

F. joint Compound: Durabond as manufactured by USG, or equal. For use at all locations where gypsum board is in direct contact with concrete curbs.

Product Link: <https://www.usg.com/content/usgcom/en/products/walls/drywall/joint-compound/setting-type-powder-joint-compounds/sheetrock-durabond-joint-compound.html>

G. Electrical Box Sealer: Lowry's "Electrical Box Pads", 6" x 8" x 1-1/8" resilient sealer pads. Covers per Electrical specification and drawings.

H. Underlayment Membrane: Membrane complying with ANSI A 108.2-3.8.

A. Metal Furring Components:

1. Resilient Channels: Clark Dietrich, Series RC-1, 1/2inch depth.
2. Wall Furring Channels: Provide USG Metal Furring Channel, 20 gage, corrosion resistant steel.

METAL SUSPENSION SYSTEM FOR DRYWALL CEILING ASSEMBLIES

A. Manufacturer: USG or equal.

B. Type: Runner and furring channel grid system.

C. Components:

1. Main Runner: Provide hot rolled channels , complying with CBC, Chapter 25, Part 2, Title 24, CCR, including Section 1614A, galvanized.
2. Cross-Furring: Provide galvanized hat channels, , complying with CBC, Chapter 25, Part 2, Title 24, CCR, including Section 1614A.

2.5 WEATHER BARRIER

A. See Section 07 25 00, "Weather Barriers"

2.6 OTHER MATERIALS

A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- B. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- C. Verify framing members are properly installed and will comply with specified tolerances.
- D. Verify that openings, curbs, pipes, sleeves, ducts, and vents are solidly set, and blocking and backing is in place.
- E. Do not proceed with installation of wallboard until deficiencies are corrected and surfaces to receive wallboard are acceptable.
- F. In the event of discrepancy, immediately notify the Architect.
- G. The Painting Contractor shall not be required to accept the gypsum wallboard installation until after he has applied sealer. At that time he shall inspect the installation and report to the General Contractor, with a letter to the Architect, of any surface damage, defects or uneven walls. Uneven walls shall mean those that are not straight, plumb or of an even, true plane. All such discrepancies shall be the responsibility of gypsum wallboard installer, and shall be corrected by him prior to application of further wall decoration.
- H. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
- I. Beginning of installation means acceptance of existing surfaces substrate.
- J. At all existing gyp. board surfaces to be refinished as shown on the drawings, Contractor shall rough sand all surfaces prior to skim coat for acceptable adhesion.

3.2 PREPARATION

- A. Insulation Coordination:
 - 1. Verify insulation is fitted tightly within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and to items passing through partitions.
 - 2. Install insulation specified in this Section as a component in rated floor/ceiling and roof/ceiling systems.

3.3 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with manufacturer's instructions and designated system number for fire rated assemblies.
 - 1. Unless noted otherwise, utilize water resistant type for wall surfaces within four feet of the outermost edge of any plumbing fixture or moisture generating equipment. Extend water resistant gypsum board full height.
 - 2. Do not use water resistant gypsum board on ceiling applications.
 - 3. Do not use water resistant gypsum board at any shower/locker room applications, wall or ceiling.

- B. Prior to installation of any gypsum board product, Contractor shall review locations of all toilet room accessories with owner to place all backing required.
- C. Install gypsum board in accordance with GA 216, and ASTM C840.
- D. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- E. Use screws when fastening gypsum board to metal furring or framing, or 1x framing.
- F. Use screws when fastening gypsum board to wood furring or framing.
- G. Fasteners for all vertical gypsum boards shall be placed at 8" at the perimeter and 12" in field U.O.N. on drawings.
- H. Treat cut edges and holes in moisture resistant gypsum board with sealant.
- I. Place control joints consistent with lines of building spaces as indicated by Architect.
- J. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
- K. Contractor shall provide new mud ring extensions for all electrical switch and outlets to allow device to flush with face of new gypsum board surface.
- L. At all locations where gypsum board extends past bottom sill plate and contacts face of curb, apply Durabond product to back side of gypsum board per manufacturer's recommendations to secure to face of concrete curb. Provide moderate pressure and temporary nailing or shoring to ensure adequate bond.
- M. Where gypsum board extends across concrete curbs, install with specified adhesive, consisting of vertical beads placed at 4 inches on center full height. Bond to curb with rollers exerting sufficient pressure to assure full contact and surface alignment with board at framing above.
- N. Use screws of proper length when fastening gypsum board to framing, spaced at 8 inches on center maximum at each support.
- O. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
- P. Double Layer Applications: Place second layer parallel to first layer. Offset joints of second layer from joints of first layer a minimum of one stud spacing, and as required by referenced test standard.
- Q. Edge and Trim Installation:
 - 1. Install corner beads at all external corners. Use longest practical length.
 - 2. Install corner beads at all conditions where gypsum board abuts dissimilar materials.
 - 3. Install angle reinforcement at interior corners.
 - 4. Tape and finish joint reinforcement as specified.
- R. Install acoustical sealant at wall edge perimeter, including floor edge, and at all penetrations where fire stopping is not required.

3.4 GYPSUM BOARD FINISH AND JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- C. Comply with descriptions and Finish Levels as specified and in accordance with referenced standard.
- D. LEVEL 1 Finish: Gypsum board located above ceiling areas, plenums, and similar surfaces not visible in completed construction:
 - 1. Embed tape at all joints and interior angles in joint compound.
 - 2. Apply one separate coat of joint compound over all joints, angles, fastener heads, and accessories.
 - 3. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
- E. LEVEL 1 Finish: Gypsum board designated to receive rigid FRP or solid paneling.
 - 1. Embed tape at all joints and interior angles in joint compound.
 - 2. Apply two separate coats of joint compound over all joints, angles, fastener heads, and accessories.
 - 3. All joint compound shall be smooth and free of tool marks and ridges.
 - 4. Apply uniform coat of approved primer over entire surface with roller.
- F. LEVEL 3 Finish - Knock-Down Finish: Gypsum board designated to receive flat paint finish.
 - 1. Embed tape at all joints and interior angles in joint compound.
 - 2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.
 - 3. Apply texture coating over entire surface. Finish in "Knock-Down" texture as illustrated in USG Construction Handbook. Surface shall be smooth and free of tool marks and ridges.
 - 4. Apply uniform coat of approved primer over entire surface with roller.
- G. LEVEL 4 Finish - Orange Peel: Gypsum board surfaces receiving eggshell, semi-gloss or gloss paint finish.
 - 1. Embed tape at all joints and interior angles in joint compound.
 - 2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.
 - 3. Apply texture coating over entire surface. Finish in "Orange Peel" texture as illustrated in USG Construction Handbook. Surface shall be smooth and free of tool marks and ridges.
 - 4. Apply uniform coat of approved primer over entire surface with roller.
- H. LEVEL 5 Finish - Smooth: Gypsum board surfaces receiving eggshell, semi-gloss or gloss paint finish.
 - 1. Embed tape at all joints and interior angles in joint compound.
 - 2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.
 - 3. Apply thin skim coat of joint compound over entire surface. Sand as necessary. Surface shall be smooth and free of tool marks and ridges.
 - 4. Apply uniform coat of approved primer over entire surface with roller.

3.5 TOLERANCES

- A. Comply with the following tolerances for level, plumb and flat. Where substrate framing will not comply with specified tolerances, correct deficiencies as required.
 - 1. Level and Plumb: Plus or minus 1/4 inch in 10 feet, non-cumulative.
 - 2. Flatness: No gaps exceeding 1/8 inch at any point under a 10 foot straight edge placed on surface in any orientation.

3.6 ACOUSTICAL ACCESSORIES INSTALLATION

- A. Install acoustical sealant within partitions in accordance with manufacturer's instructions.
- B. Install resilient sealer pads over backs and sides of electrical junction boxes.

3.7 ADJUST AND CLEAN

- A. Cleaning and Repair: Clean surfaces that have been spotted or soiled during wallboard application. Contractor shall clean all light fixture lenses, fire alarm devices, electrical outlets, as performing work.
- B. Defective Work: Remove and replace defective work which cannot be satisfactorily repaired, at the direction of the Architect, with no additional cost to the Owner.
- C. Protection: Protect installed work against damage from other construction work.

3.8 CLEAN-UP

- A. Upon completion of the work under this Section, remove all surplus material, rubbish and debris from the premises and leave floors "broom clean".

END OF SECTION

SECTION 09 22 36

CEMENT PLASTER LATHING AND LATH ACCESSORIES

PART 1 - GENERAL

1.1. DESCRIPTION

- A. This Section includes cement plaster lathing and lath accessories over a continuous water-resistive barrier system with solid continuous sheathing and framed structural supports.

1.2. RELATED SECTIONS

- A. Section 07 25 00 Water Resistive Barrier System
- B. Section 09 24 00 Portland Cement Plastering

1.3. SUBMITTALS

- A. Product Data: Submit each type of lath, fastener and accessory.
- B. Shop Drawings: Submit wall elevation shop drawings showing lath accessory locations, for District's Representative's review and approval. Submit shop drawings for any locations requiring lath accessories that are not clearly depicted in Drawings.

1.4. QUALITY ASSURANCE

- A. Installer shall have 5 years of documented previous lathing experience on at least 5 similar scope projects, using the specified or generically comparable materials.
- B. Perform work in accordance with the current building code requirements.
- C. Follow recommendations of ASTM C1063 Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster, Portland Cement Association Plaster/Stucco Manual EB049 and ACI 524-R Guide to Portland Cement Based Plaster.
- D. Mock-ups: Provide products, assemblies, and related materials for the composite mock-ups. Mockup must include expansion and control joint detailing, opening flashing, top of wall and bottom of wall drip flashing details. Mockup can be used in final construction.
- E. Pre-Installation Conference: Conduct conference at Project site in accordance with the requirements of Section 01 31 19 Project Meetings and the following:
 - 1. Notify participants including District's Representative, Contractor, Sheet Metal Flashing, Window and Sealant Subcontractors as appropriate and District's Waterproofing Consultant at least 7 calendar days before conducting meeting.
 - 2. Review material selections and procedures to be followed in performing the Work.
 - 3. Review in detail job conditions, schedule, construction sequence, and quality of completed installation.
 - 4. Review installation of lathing, lath accessories, with special attention to detailing of control joints and expansion joints.
 - 5. Record discussions of conference and any conflict, incompatibility, or inadequacy. Furnish

a copy of record to each participant.

1.5. ENVIRONMENTAL QUALITY ASSURANCE

- A. Provide lathing and lath accessories with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum percentage of cost of materials used for the Project as required for the LEED Credit.

1.6. PRODUCT DELIVERY, STORAGE, AND HANDLIN

- A. Refer to Section 01 60 00 Product Requirements.
- B. Deliver products and materials in original unopened packages, containers, or bundles with manufacturer's label intact and legible.
- C. Remove items delivered in broken, damaged, rusted, or unlabeled condition from Project site immediately.
- D. Protect lathing and lath accessories from moisture and other sources of damage.
- E. Store metallic materials and accessories indoors, off the floor.

PART 2 - PRODUCTS

1.1. LATHING

- A. Lath for vertical surfaces (walls): Self-furred, welded wire, galvanized steel, 17 gage, 1-1/2 inch x 1-1/2 inch, 1.14 lbs./sy.
 - 1. Chicago Metallic 38-3/8 inch x 150 ft long rolls, or equal, no known equal.
 - a. 1/4 Inch self-furred lath, to the underside of the cross wire, each cross wire is furred. Furring rows every 3 inch on center.
 - b. Double wires at fastener locations.
- B. Lath for horizontal surfaces (ceilings/soffits): Self-furred with continuous V-groove, expanded metal, galvanized steel G60, 3.4 lbs./sy., with paper backing to facilitate spray applications. Chicago Metallic, or equal.

1.2. FASTENERS

- A. Screws (for light gage metal framing):
 - 1. General: ASTM C646, corrosion resistant, for attachment to metal framing 25 gauge and lighter; ASTM C954 for attachment to metal framing 20 gauge and heavier.
 - 2. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than three exposed threads.
- B. Tie Wires: No. 18 gauge, galvanized, single strand annealed steel.

1.3. LATH ACCESSORIES

- A. General: Fabricated from hot-dip galvanized steel sheet, ASTM A 653/A 653M, G60 zinc

coating. 26 gauge minimum, 3/4 inch minimum ground depth, typical unless otherwise noted below. Cemco, Amico, Stockton Products, or equal.

1. Foundation weep screed flashing: #7 Foundation weep screed, with sloped drainable plaster termination surface, 3-1/2 inch solid sheet metal flange, non-perforated.
2. Soffit drip screed: #12 soffit drip, with sloped drainable plaster termination surface, 3-1/2 inch solid sheet metal flange, non-perforated.
3. Drip screed above wall opening head flashings such as windows, doors, louvers: #36 drip screed, 3-1/2 inch solid sheet metal flange, non-perforated.
4. Soffit vent: Standard profile soffit vent reveal screed.
5. Outside corner reinforcement: Welded wire, galvanized, plastic nose. Corner-Aid, or equal.
6. Casing bead: Square edge, expanded sheet metal flange. Provide deep leg casing bead where required for perpendicular sealant bearing surface.
7. Expansion joint: 2-piece galvanized steel, solid sheet metal flanges.
 - a. For horizontal orientations only: Drainable, non-perforated: M-Slide, or equal.
 - b. For vertical orientations on walls only: #40.
8. Control joint:
 - a. 1/2 Inch ground depth, minimum.
 - b. For vertical orientations on walls only, and all soffits: XJ-15, galvanized steel, expanded sheet metal flanges.
 - c. For horizontal orientations on walls only: Solid leg #15 control joint, G90 galvanized steel, Cemco, or equal, no known equal.

PART 3 - EXECUTION

1.1. INSTALLATION, GENERAL

- A. Install materials in conformance with CBC Chapter 25 requirements and ASTM C1063.
- B. Install lath continuously and perpendicular to supports, over the water-resistive barrier system and continuous solid sheathing.
- C. Fasten lath to supports at 6 inches on center and avoid installing excessive fasteners to minimize cracking.
- D. Fasten lath edges into framing, within 2 inches from lath sides or edges.
- E. Provide control joints conforming to locations identified by District's Representative, but not to exceed 10 feet on center maximum.

1.2. INSTALLATION OF LATHING

- A. Vertical walls:
 1. Install horizontal drainage components including sheet metal flashings, weep screeds, soffit drips, 1-piece horizontal control joints, 2-piece horizontal expansion joints and drip

screeds, and weather lap with water-resistive barrier system components to ensure drainage.

2. Install lath horizontally onto vertical wall surfaces, lap lath sides and ends not less than 1 mesh for wire lath.
3. Attach lathing to framing supports with fasteners spaced 6 inches apart vertically, generally between the doubled lath wires when using screws into metal framing, or at cross wires when using nails into wood framing, at each vertical framing support member.
4. Lath fasteners into horizontal framing or blocking in framed vertical walls are not required.
5. Install lath continuously into and around wall corners, where the structural support system is the same on both sides of the corner. Provide #30 control joint at interior corners of different support system substrates.
6. Wire tie or crimp lathing side laps as required to assure continuous direct lathing contact during plastering.
7. Prevent damage to, and immediately repair damage that does occur, to the water-resistive barrier system. Repair defects of the water-resistive barrier system immediately when observed and as lathing progresses. Repair any conditions caused by lathing and lath accessory installation that would allow water intrusion, such as spinners and shiners (removed or abandoned fasteners that miss supports), tears, rips overdriven fasteners, or any other condition that would allow bulk water intrusion beyond the water-resistive barrier system into the building.

B. Horizontal ceilings and soffits:

1. Lap lath sides and ends not less than 1 inch for expanded sheet metal lath at soffits.
2. Comply with CBC 2507.3 requirements for soffit lath fasteners and installation.

1.3. INSTALLATION OF LATH ACCESSORIES

A. General:

1. Align grounds of lath accessories to true lines, plumb, level, and straight. Bend expanded flange accessories into fine alignment, do not shim.
2. Connect lengths of accessories as recommended by the manufacturer to assure a continuous line.
3. Install accessories to provide required depth of plaster and to bring plaster surface to required planar tolerance.
4. Secure lath accessories in place as required to prevent dislodging or misalignment during plastering installation. Use self-tapping screws into metal framing supports.
5. In general, attach lath accessories over water-resistive barrier system, over lathing, unless noted otherwise.
6. Terminate ends of lath accessories at intersections with other lath accessories. Do not allow in-line butt splices at locations other than at lath accessory intersections.
7. Lap water-resistive barrier system components and lathing over solid flange lath accessories and drainage flashings to ensure drainage.
8. Fasten solid flange lath accessories 7 inches on center into the upper 1-1/2 inch of solid

vertical flange, into supports.

9. Embed laps, terminations, transitions and intersections into solid sealant setting bed to prevent bulk water intrusion into the wall assembly.
- B. Lath accessory installation and fastening:
1. Weep, soffit, and drip screeds: Fasten through solid flange into supports.
 2. Soffit vent: Discontinue lath and water-resistive barrier system at vent, fasten vent into supports.
 3. Casing beads:
 - a. Use single length casing beads wherever length of run does not exceed 10 feet and miter or cope corners.
 - b. Provide 3/8 in. minimum gap for sealant between casing bead, wall openings and penetrations.
 - c. Set casing beads level, plumb, and true to line, fasten to supports.
 - d. Provide casing beads at the following locations:
 - 1) Where plaster abuts dissimilar construction.
 - 2) At perimeter of openings where edges of plaster will not be concealed by other Work.
 4. Outside corner reinforcement: Fasten to supports. Install continuous corner reinforcement for full length of external corners.
 5. Expansion joint: Fasten flanges into supports, centered over gap in supports.
 6. District's Representative will approve location of control and expansion joints. At intersections of vertical and horizontal joints, continue horizontal joint through intersection.
 7. Solid flange #15 control joint, horizontal: Discontinue lath through control joint. Fasten upper solid flange of control joint and lath side into supports. Fasten lath side below control joint into supports and wire tie lower control joint expanded sheet metal flange to lath side at 7 inches on center.
 8. Expanded flange control joint, vertical: Discontinue lath through control joint, fasten lath edges to supports at 7 inches on center. Wire tie expanded sheet metal flanges of control joints onto lath at 7 inches on center.

END OF SECTION

SECTION 09 24 00

PORTLAND CEMENT PLASTERING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Metal furring and lathing.
- B. Three-coat Portland cement plaster system with integral color stucco finish coat.
- C. Patching of interior plaster, with smooth finish coat.

1.2 RELATED SECTIONS

- A. Section 00 72 00: General Conditions.
- B. Section 09 90 00: Painting.

1.3 REFERENCES

- A. ANSI/ASTM C1063-16c - Installation of Lathing and Furring to Receive Interior and Exterior for Portland Cement-Based Plaster.
- B. ANSI/ASTM C91 / C91M-12 - Masonry Cement.
- C. ASTM C150 / C150M-16e1 - Portland Cement.
- D. ANSI/ASTM C206-14 - Finishing Hydrated Lime.
- E. ASTM C847-14a - Metal Lath.
- F. ANSI/ASTM C897-15 - Aggregate for Job-Mixed Portland Cement-Based Plasters.
- G. ANSI/ASTM C926-16b - Application of Portland Cement-Based Plaster.
- H. FS-UU-B-790 - Building Paper, Vegetable Fiber (kraft, waterproofed, water repellent and fire resistant).

1.4 QUALITY ASSURANCE

- A. Applicator: Company specializing in cement plaster work with five years experience.
- B. Apply cement plaster in accordance with ASTM C926.

1.5 SUBMITTALS

Project Name/Increment
Project Number

Issue Date:
Revision Date:

- A. Submit product data under provisions of Section 00 72 00.
- B. Provide product data on furring and lathing components, plaster materials, characteristics and limitations of products specified, and plastering accessories.
- C. Submit manufacturer's installation instructions under provisions of Section 00 72 00.
- D. Submit color charts for selection of integral color finish coat from manufacture's standard range of a minimum of twelve colors. (Note that the plaster is also required to be painted under Section 09900).
- E. Submit sample of selected color and texture to match existing finish.

1.6 PRODUCT HANDLING

- A. Delivery, storage and handling in accordance with provisions of Section 00 72 00.
- B. Deliver manufactured products to job site in their original unopened containers with labels intact and legible at the time of use.
- C. Do not permit scattering of materials or equipment but use necessary means to ensure neatness of the site and structure at all times.
- D. Perform cleaning of tools and equipment only in the area designated for that purpose.
- E. Protection: Use means necessary to protect lath and plaster materials before, during and after installation and to protect the installed work and materials of other trades.
- F. Replacements: In the event of damage, immediately make repairs and replacements necessary to the approval of the Architect and at no additional cost to Owner.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply plaster when substrate or ambient air temperature is less than 50 degrees F. nor more than 90 degrees F. If freezing is expected, do not apply plaster beyond period of day necessary for hydration.
- B. Maintain minimum ambient temperature of 50 degrees F. during and after installation of plaster.
- C. Protect plaster from uneven and excessive evaporation during any weather.

PART 2 – PRODUCTS

2.1 PLASTER MATERIALS

- A. Cement: ASTM C150, Normal - Type I, low alkali; grey color; Portland Cement.

- B. Admixture: PRF Admixture as manufactured by Gibco, Inc.
- C. Aggregate: In accordance with ANSI/ASTM C897-05(latest edition), except that gradation shall meet the following requirements:

Sieve Size	Percent Retained on each sieve (by weight)	
	Maximum	Minimum
No. 4	0	-
No. 8	10	0
No. 16	40	10
No. 30	65	30
No. 50	90	70
No. 100	100	90-95

- D. The sand should not have more than 50% retained between any two consecutive sieves nor more than 25% between Nos. 50 and 100 sieves.
- E. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.
- F. Pre-Mixed Finish Coat (Stucco): Acrylic modified water-repellent Portland cement base with integral color prepared in accordance with specifications of the Stucco Manufacturers Association. Acceptable Manufacturers: Peerless Stucco, La Habra, or approved equal. Texture to match existing. Color as selected by Architect from Manufacturer’s standard range of a minimum of twelve colors.
- G. Acrylic Modifier for Finish Coat: Acryl 60 as manufactured by Thoro Systems Products(BASF).

2.2 FURRING AND LATHING

- A. General: All metal to be galvanized steel or zinc alloy.
- B. Metal Lath: Hot dipped galvanized, ASTM A653 / A653M, G60 coating designation for use over solid substrate. Provide and install self-furring lath and furring nails.
- C. Expanded Metal Lath: ASTM C847.
- D. Vertical Walls: Self-furring diamond mesh weighing 3.4 pounds per square yard, with evenly spaced furring nails to hold lath approximately 1/4 inch away from substrate for use at non-sheathed substrates.
- E. Horizontal Areas: 3/8 inch Rib Lath: 3.4 pounds per square yard, fabricate in herringbone mesh pattern with 3/8 inch deep ribs for use at suspended plaster ceilings and soffits.
- F. Building Paper: FS-UU-B-790, Style 2, Grade D.

- G. Fasteners: Provide types and sizes required in CBC, 2016 edition, Table 2507.2. Metal framing: use self-drilling, self-tapping #12 x 2" wafer head screws. Spacing of nails, staples or screws is not more than 7" on center along the framing member (horizontal or vertical).
- H. Metal Accessories: General: Minimum 26-gauge galvanized steel or zinc alloy, perforated or expanded flanges as manufactured by USG, Clark Western, Keene/Metelex or approved equal. Use longest possible length; sized and profiled to suit application. Other special products, shapes and sizes as identified in the drawings.
- I. Corner beads: Small-nose type.
- J. Casing Beads: No. 66 square edge.
- K. Expansion Screed: Accordion profile, Clark Western #XJ15 unless special shapes are detailed.
- L. Sill Screed: Clark Western No. 7 Foundation sill screed.
- M. Soffit Vent Screed: Clark Western, 26 GA., perforated soffit vent of profile indicated.
- N. Corner Reinforcement: Cornerite, minimum 1.75-pounds per square yard expanded metal lath with minimum 2-inch legs.
- O. Strip Reinforcement: For reinforcing joints of dissimilar materials and diagonal reinforcement at opening corners, minimum 1.75-pounds per square yard.
- P. Glass Fibermesh: Perma Glas-Mesh Corporation's #207A, 6 inches wide, adhesive backed, 10x10 mesh.

2.3 CEMENT PLASTER MIXES

- A. Mix and proportion cement plaster as follows:
- B. Scratch coat proportions: One part Portland cement, 4 parts aggregate and 3 ounce PRF admixture. Provide glass fiber reinforcing equal to Fiber Mesh in quantities as recommended by Manufacturer to control cracking.
- C. Brown coat proportions: One part Portland cement, 5 parts aggregate, and 3 ounces PRF admixture.
- D. Mix only as much plaster as can be used in one hour.
- E. Mix materials dry, to uniform color and consistency, before adding water.
- F. Protect mixtures from frost, contamination, and evaporation.
- G. Do not retemper mixes after initial set has occurred.

2.4 PATCHING MATERIAL

- A. 2" wide self-adhering nylon tape.

PART 3 – EXECUTION

Project Name/Increment
Project Number

Issue Date:
Revision Date:

3.1 INSPECTION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Inspect the installed work of other trades and verify that such work is complete to the point work of this section may begin.
- C. Verify that substrate is plumb, level, square and aligned.
- D. Report in writing conditions which might adversely affect the performance of installed lath and plaster to the General Contractor with a copy to the Architect.
- E. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Protect surfaces near the work of this Section from damage or disfiguration.
- B. Saw cut back all existing plaster, careful not to damage existing building paper, to accommodate 6" lap with new building paper.

3.3 INSTALLATION - LATHING MATERIALS

- A. Install metal plaster bases and accessories in conformance with CBC, 2016 edition, Section 2507 and ASTM C1063.
- B. Apply two layers of building paper underlayment, weatherlap edges 2 inches minimum horizontal and 6 inches minimum vertical laps. Continue building paper minimum 6 inches around inside and outside corners.
- C. Attach metal lath to metal framing with 7/16 inch diameter pan wafer head and a 0.120 inch diameter (#8) shank long enough to penetrate framing a minimum of 3/8 inch.
- D. Screws shall be self-drilling or self-tapping as required in accordance with ASTM C954.
- E. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement. Fasten at perimeter edges only.
- F. Place external angle with mesh at corners. Fasten at outer edges only.
- G. Place strip mesh diagonally at corners of lathed openings. Secure rigidly in place.
- H. Place 4 inch wide strips of glass fiber mesh over scratch coat centered on point of corner at doors, windows, recesses, and other angular openings in building wall. Extend minimum 8 inches diagonally from point of corner.
- I. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- J. Install accessories to lines and levels.

- K. Install expansion screeds over all building joints and at intervals recommended by the Lath and Plaster Bureau, and where shown.

3.4 PLASTERING

- A. General: When complete, plaster surfaces shall be flat, true to plane, free from defects and shall be uniform in texture.
- B. Apply plaster in accordance with ASTM C926.
- C. Apply scratch coat to a nominal thickness of 3/8 inch over metal reinforcement. Cover metal reinforcement.
- D. After application, lightly score scratch coat horizontally.
- E. If brown coat cannot be applied within 4 hours, keep scratch coat moist for 48 hours.
- F. Apply brown coat to a nominal thickness of 3/8 inch over scratch coat. Rod brown coat straight and true in all directions.
- G. Moist cure brown coat for minimum 14 days. Areas shall be thoroughly moistened by use of a fine mist at a minimum of three times daily and as may be required due to weather conditions, per the Lath and Plaster Bureau recommendations.

3.5 STUCCO FINISH

- A. No finish coat.

3.6 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 5 feet, properly meeting adjacent surfaces and materials.

3.7 CLEANING

- A. Remove plaster and protective materials from control and expansion joints, perimeter beads and adjacent surfaces. Remove stains that would adversely affect subsequent finishes on plaster.

END OF SECTION

SECTION 09 28 13
CEMENTITIOUS BACKING BOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Gypsum board.
 - 1. Cementitious backer boards

1.2 RELATED SECTIONS

- A. Section 07 13 26 - Self-Adhering Sheet Waterproofing
- B. Section 07 21 00 - Thermal and Acoustical Insulation
- C. Section 08 11 00 - Hollow Metal Doors and Frames
- D. Section 08 31 13 - Access Doors and Frames.
- E. Section 09 30 13 - Ceramic Tiling
- F. Section 09 78 26 - Fiberglass Reinforced Wall Panels (FRP)
- G. Section 09 70 00 - Vinyl Wall Covering
- H. Work may be required to be coordinated with other sections

1.3 REFERENCES ASTM C 645 – Standard Specification for Nonstructural Steel Framing Members

- B. ASTM C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
- C. ASTM D 3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- D. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials
- E. ANSI A118.9 - Specifications for Test Methods and Specifications for Cementitious Backer Units
- F. Conform to CBC Chapter 7 / CBC Chapter 7A, Part 2, Title 24, CCR for fire rated assemblies.
- G. Conform to CBC Chapter 25 / CBC Chapter 25A, Part 2, Title 24, CCR for finish materials installation.
- H. Conform to DSA Interpretation of Regulations document IR 25-3.13 for gypsum board ceiling suspension.

1.4 SUBMITTALS

- A. Provide submittals under provisions per Section 01 33 00, “Submittal Procedures”.
- B. Submit product data indicating materials, joint toppings and finish materials, and accessories.
- C. Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Provide company who has produced the specified products for a period of 5 years prior to beginning work of this Section and maintains the capability to provide the specified products in compliance with the delivery and quantity criteria for the Project.
- B. Installer: For installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this Section, and who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.6 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance.
 - 1. United States Gypsum Co., USG. Phone - (800) 874-4968
 - 2. Georgia Pacific Building Products – Phone - (800) 225-6119
 - 3. Substitutions per Section 01 62 00, “Product Options”.

2.2 CEMENTITIOUS BACKER UNIT (CBU)

- A. Manufacturers:
 - 1. James Hardie Building Products
 - 2. USG
 - 3. Custom Building Products
 - 4. Substitutions per Section 01 62 00.
- B. Series: James Hardie Building Products, Hardiebacker Cement Board, per ANSI A118.9. Phone – (916) 747-1771. Website Link: <https://www.jameshardie.com/products/hardiebacker-cement-board>
 - a. Thickness: 1/2 inch or as indicated.
 - b. Edge: Smooth wrapped edge.
- C. Series: USG, Durock Cement Board, per ANSI A118.9. Phone – (800) 874-4968. Website Link: <https://www.usg.com/content/usgcom/en/products/floors-tile-showers/tile-prep/cement-board-backer-board/durock-cement-board-with-edgeguard.html>

1. Characteristics:
 - a. Thickness: 1/2 inch or as indicated.
 - b. Edge: Smooth wrapped edge.
- D. Series: Custom Building Products, Wonderboard Lite Backer Board, per ANSI A118.9. Phone – (800) 282-8786. Website Link: <https://www.custombuildingproducts.com/products/surface-preparation/cement-backerboards/wonderboard-lite-backerboard.aspx>
 - a. Thickness: 7/16 inch or as indicated.
 - b. Edge: Smooth wrapped edge.
- E. Characteristics:
 1. Indentation Resistance: 2300 psi, 1 inch disc at 0.02 inch indentation per ASTM D2394.
 2. Water Absorption: 10 percent maximum at 24 hours per ASTM C473.
 3. Flexural Strength: 750 psi per ASTM C947.
 4. Fire and Life Safety Criteria:
 - a. Surface Burning/Smoke contributed: Maximum values of 5/0 per ASTM E84.
 - b. Listing: UL Listed as a component in rated wall and floor assemblies per ASTM E119.
- F. Fasteners:
 1. Cementitious Backer Unit Screws: corrosion resistant, type and length as required by manufacturer, installation and UL Listing criteria. Nails not permitted.

2.3 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- B. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- C. Verify framing members are properly installed and will comply with specified tolerances.
- D. Verify that openings, curbs, pipes, sleeves, ducts, and vents are solidly set, and blocking and backing is in place.
- E. Do not proceed with installation of cementitious backer boards until deficiencies are corrected and surfaces to receive backer boards are acceptable.
- F. In the event of discrepancy, immediately notify the Architect.
- G. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

- H. Beginning of installation means acceptance of existing surfaces substrate.
- I. At all existing gyp. board surfaces to be refinished as shown on the drawings, Contractor shall rough sand all surfaces prior to skim coat for acceptable adhesion.

3.2 PREPARATION

- A. Insulation Coordination:
 - 1. Verify insulation is fitted tightly within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and to items passing through partitions.
 - 2. Install insulation specified in this Section as a component in rated floor/ceiling and roof/ceiling systems.

3.3 CEMENTITIOUS BACKER BOARD INSTALLATION

- A. Install backer board in accordance with manufacturer's recommendations, including USG Document SA-934, "Moisture-Resistant Assemblies".
- B. Apply specified underlayment membrane to framing with approved adhesive or tape. Lap membrane 4 inches in shingle fashion at all joints.
- C. Install backer board with joints over supports. Space ends and edges 1/8 inch apart.
- D. Install backer board using screws at maximum 8 inches on center at each support.
- E. Prefill all joints with approved latex fortified mortar meeting ANSI 118.4. Tape all joints and level.
 - 1. Apply uniform coat of approved primer over entire surface with roller.

3.4 TOLERANCES

- A. Comply with the following tolerances for level, plumb and flat. Where substrate framing will not comply with specified tolerances, correct deficiencies as required.
 - 1. Level and Plumb: Plus or minus 1/4 inch in 10 feet, non-cumulative.
 - 2. Flatness: No gaps exceeding 1/8 inch at any point under a 10 foot straight edge placed on surface in any orientation.

END OF SECTION

SECTION 09 30 13
CERAMIC TILING

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Ceramic tile.
- B. Grout, mortar bed and setting materials.
- C. Waterproof underlayment and membranes.
- D. Crack isolation/sound isolation/cleavage membranes.
- E. Sealers.

1.2. RELATED SECTIONS

- A. Section 09 21 16 - Gypsum Board & Cementitious Backerboard
- B. Section 03 30 00 – Cast in Place Concrete
- C. Section 05 40 00 Cold-Form Metal Framing
- D. Section 09 21 16 – Gypsum Board
- E. Section 09 61 43 – Water Vapor Emissions Testing

1.3. REFERENCES (Current Edition for All Standards Listed)

- A. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.
- B. ANSI A108/A118/A136.1:2017: American National Specifications for the Installation of Ceramic Tile
- C. ANSI A118 (All Sections) – Material Specifications
- D. ANSI A136 – American National Specifications for the Installation of Ceramic Tile
- E. ANSI A137.1 – American National Standard Specifications for Ceramic Tile

1.4. SUBMITTALS

- A. Samples
 - 1. Submit four samples of specified colors and patterns of each tile, grout, and accessory units of the specified items.
- B. Materials List/Details:
 - 1. Accompanying samples, submit complete list of all proposed materials, including details of all joints between tile and adjoining materials.
- C. Certification:

1. Prior to installation of tile in any one area, submit written certification to Architect certifying that surfaces are properly prepared for specified installation, and that all depressions and abutting edges are properly spaced and aligned to permit installation in pattern shown on drawings.
2. Submit certification that selected sealant specified in Section 07 90 00 will achieve manufacturer's published adhesion values on specified tile.

1.5. QUALITY ASSURANCE

- A. Conform to ANSI A108, A118, A136 & A137.1.
- B. Conform to Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation methods as defined in this Section.

1.6. QUALIFICATIONS

- A. Manufacturer:
 1. Manufacturer shall have produced tile products of similar type for a period of five (5) years prior to beginning work of this section and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- B. Staff
 1. Use only personnel thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.
 2. Staff installing specified grout shall have attended manufacturer's training sessions and have installed specified grout within the past 12 months prior to beginning work.

1.7. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and protect products to site under provisions of Section 01 66 00.

1.8. ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesives in a closed, unventilated environment.
- B. Maintain 50 degrees F during installation of mortar materials.

1.9. WARRANTY

- A. Special Warranty: Provide for correcting failures of waterproofing to resist water penetration, except where failures are the result of structural failures of the building. Hairline cracking of concrete due to temperature or shrinkage is not considered structural failure.
 1. Repair and pay for or replace damaged materials and surfaces.
 2. Special Warranty: Two years from Notice of Completion.

1.10. EXTRA STOCK

- A. Provide additional 5% or minimum 1 full box, whichever is greater, of extra tile of each type, size, and color used.

PART 2 - PRODUCTS

1.1 CERAMIC TILE – FLOORS AND WALLS – CT-1 through CT-11

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance.
1. All tile for like applications shall be the product of a single manufacturer as indicated below.
 - a) Product Characteristics - Interior Wall and Floor Tile:
 - b) Manufacturer: Crossville, or equal
 - i) Product Representative – Lisa Bozzano-Schletewitz
 - (a) Phone: (209) 401 3161
 - (b) e-mail: lbozzano@longust.com
 - (c) General Product Catalogue: <http://crossvilleinc.com>
 - c) Series and Color: Refer to Finish Legend on Sheet A8.1.1.
 - d) Grout Joints: Nominal 1/16 inch, all joints equal, except at expansion joint conditions. Provide minimum 1/8 inch wide joint at all expansion joint conditions.
 - e) Provide surface bullnose trim at all open edges or ends. Unglazed or cut tile edges unacceptable.
 - f) Substitutions: Refer to Section 01 25 16.

1.2 PORTLAND CEMENT THICKSET MORTAR BED - FLOOR

A. Mortar Bed

1. Manufacturer: Mortar - Laticrete “#226 Thick Bed Mortar”, or equal, Phone - (800) 243-4788. Website Link - <https://laticrete.com/tile-and-stone-installation/thick-bed-mortars-and-screeds/226-thick-bed-mortar>
2. Manufacturer - Mortar Admix For Use With 226 Thick Bed Mortar – Laticrete “#3701 Mortar Admix”, or equal. Website Link: <https://laticrete.com/tile-and-stone-installation/thick-bed-mortars-and-screeds/3701-mortar-admix>
3. Acceptable Alternate:
 - a. Manufacturer – Laticrete, “#3701 Fortified Mortar Bed”, or equal. Website Link: <https://laticrete.com/tile-and-stone-installation/thick-bed-mortars-and-screeds/3701-mortar-admix>
4. Substitutions: Refer to Section 01 25 16.

1.3 GROUT – FLOORS AND WALLS

A. Epoxy Grout (District Standard – Basis of Design):

1. Manufacturer: Laticrete International, Inc. “SpectraLock Pro Grout”, or equal. Phone - (800) 243-4788. Website Link: <https://laticrete.com/tile-and-stone-installation/grouts/epoxy-grouts/spectralock-pro-premium-grout>
2. ANSI A118.7, epoxy cementitious type, uniform in color, resistive to shrinkage.
3. Color: Refer to Finish Plan on Sheet A8.1.1.
4. All grouts shall be produced by same manufacturer.
5. Substitutions: Refer to Section 01 25 16.

1.4 LATEX THINSET BOND COAT AT WALLS: Thinset bond coat, consisting of cementitious mortar conforming to ANSI A118.4.

A. Manufacturers (District standards shown):

1. Floors -- Laticrete International, Inc. “Latopox 210 Adhesive”, or eq., Phone - (800) 243-4788. Website link <https://laticrete.com/tile-and-stone-installation/adhesives-and-mortars/epoxy-adhesives/latapoxy-210-adhesive>
2. Walls - Laticrete International, Inc. “15 Premium Mastic”, or eq., Phone - (800) 243-4788. Website link <https://laticrete.com/tile-and-stone-installation/adhesives-and-mortars/mastic/15-premium-mastic>
3. Substitutions: Refer to Section 01 25 16.

1.5 SEALERS AND FINISHES

A. Grout Sealer:

1. Bostik Construction Products, Grout Sealant and Colorant, or equal, Phone (800) 726-7845. Website link: <https://www.bostik.com/us/Bostik-products/Bostik-Grout-Sealer-Colorant>
2. Acceptable Alternative: Miracle Sealants 511 Impregnator, or equal - Phone (800) 350-1901. Website link - <https://www.rustoleum.com/product-catalog/consumer-brands/miracle-sealants/seal-protect/511-impregnator>
3. Substitutions: Refer to Section 01 25 16.

- B. Floor Sealer (Under Epoxy Set Floors): Curing hardener sealer vapor retarder to prevent bond failure of flooring systems – Basis of Design - Creteseal, “CS2000”, or equal. Phone - (800) 278-4273, website link <http://www.creteseal.com/creteseal-products/>

1.6 ACCESSORIES

A. Sealants:

1. Interior sealants: Unless noted otherwise, provide sealants as manufactured by grout manufacturer.

2. Match adjacent grout color.
- B. Reinforcing Mesh:
 1. 2 x 2 inch square x 16 gauge welded wire mesh - per ASTM A82 and A185.
- C. Organic Adhesive:
 1. Type 1 organic adhesive, complying with ANSI A136.1 and approved by CTI for application.
- D. Cleavage Membrane:
 1. Provide asphalt felt, ASTM D226, Type I (No. 15), or polyethylene sheet, ASTM D4397, 4.0 mils thick.
- E. Edge Protection:
 1. Provide anodized aluminum edge protection profile for the external edges of tile.
 - a. Product: Schluter System - FINEC
 2. Provide anodized aluminum edge protection from tile flooring to other same-height surface covering.
 - a. Product: Schluter System - DECO

1.7 WATERPROOFING AND CRACK ISOLATION MEMBRANES

- A. Thin-set Joint Isolation Membrane:
 1. Manufacturer: Noble Company, The, "NobleSeal CIS" or "Dal-Seal CIS", or equal, preformed sheet CPE membrane, 30 mil thickness, with facing. Provide all manufacturer's recommended accessories.

1.8 ACCESSORY TILE

- A. General
 1. All accessory tile shall be in matching size, color, and finish.
 2. Stretcher tile can be the standard size of the manufacturer.
 3. Provide surface bullnose trim at all open edges or ends. Unglazed or cut tile edges unacceptable.
 4. Provide surface bullnose trim at all tile abutting jamb conditions and extending beyond frame.
 5. Provide full curved stretcher tile for all outside corners.

1.9 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify joints in concrete substrate occur only at sealant expansion joint locations as specified for ceramic tile.
 - b. Where non-documented substrate cracks occur, obtain direction from Architect.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 MEMBRANE INSTALLATION

A. Verify slab preparation complies with criteria specified in Section 03 30 00 / 03 30 10.

1. Remove all sealers, curing compounds and other materials affecting proper bond of membranes with bead blast abrasive equipment.

B. Cleavage Membrane: Unless otherwise shown on drawings, where mortar bed is installed over concrete slab on grade at interior applications, provide specified cleavage membrane.

C. Waterproofing Membrane Installation:

1. Apply waterproofing membrane per manufacturers recommendations.
 - a. Apply thinset waterproofing membrane using approved mortar system.
2. Provide preformed corners. Seal all penetrations with specified sealant.
3. Detail all joints as required by manufacturer and approved submittal.
4. Extend membrane up wall surface as shown on drawings. Coordinate with wall underlayment.
5. At expansion joints, continue sheet material in looped fashion through joint to accommodate anticipated joint movement.
6. Allow sufficient time for all seams, transitions and setting beds to cure before installing subsequent materials. Do not install tile over waterproofing until waterproofing has been tested to determine that it is watertight.

D. Joint isolation membrane installation:

1. Install at all cracks in concrete slab substrates, control and expansion joints, and at all transitions between dissimilar materials.

2. Extend each side of crack or joint a minimum of 4 times diagonal tile dimension.
3. Apply using approved latex modified mortar system.
4. At expansion joints, continue sheet material in looped fashion through joint to accommodate anticipated joint movement.

3.3 MORTAR AND GROUT MIXES

- A. Mix and proportion cementitious materials for mortar and grout mixes in accordance with manufacturers requirements.
 1. Do not mix more bond coat than can be used within one hour.
 2. If bond coat mixture begins to skin, discard and make new batch.

3.4 MORTAR BED INSTALLATION FLOORS TYP.

- A. Unless noted otherwise, prepare floor substrate as required for complete bond. Remove all sealers, curing compounds and other materials affecting proper bond of membranes with bead blast abrasive equipment.
- B. Coordinate lath and mortar bed installation with concrete slab substrate joints. Align expansion joints in mortar bed and tile with substrate joints.
- C. Install mortar bed in accordance with specified method and referenced ANSI standard.
- D. Where waterproof membrane is provided, do not penetrate membrane. Provide accessory supports.

3.5 TILE INSTALLATION

- A. Interior Tile Installation:
 1. Install wall tile at cementitious backer board per 09 20 00 and TCNA Method W244C, and per ANSI A108.5.
 - a. Provide portland cement leveling coat as required to provide surface complying with 1/8 inch in 8 feet tolerance.
 2. Install wall tile at concrete curb per TCNA Method W211/222, and per ANSI A108.1B.
 3. Install mortar bed and floor tile per TCNA F114.
 4. Grout all wall joints with specified grout per ANSI A108.10 Installation of expansion and control joint assemblies.
 5. Provide expansion joints complying with TCNA Detail EJ171 at the following specified locations and as located and shown on drawings:
 - a. At wall tile to paver/floor tile joints.
 - b. At all expansion and control joints in substrate. Where tile joint does not occur directly over substrate joint, provide sealant joint on each side of joint.
 - c. At tile joint at inside vertical corners.

- d. At interior applications, at approximately 24 feet on center each way in floor and wall tile surfaces. Adjust to 12 feet at toilet tile conditions, and 8 feet for dark tile in sunlight areas.
- e. Where material transitions occur, comply with expansion/control joint criteria.
- f. At conditions where tile extends through doorways, extend wall cove/floor tile sealant joint across doorway.
- g. At floor drain/tile edge, column penetrations, tile terminations against frames and other restraining elements.
- h. At tile terminations against curbs, paving or other restraining elements.

3.6 CLEANING

- A. Clean tile surfaces in accordance with the tile and grout manufacturer's instructions; remove all traces of grout scum.
- B. Do not use muriatic acid compounds.
- C. Do not allow traffic on tile for a minimum of 72 hours after installation.
- D. Provide damp cure of all installations per manufacturer's recommendations and per ANSI A108.
 - 1. Do not damp cure latex modified grout systems unless recommended by manufacturer.
- E. Sealing
 - 1. Seal all interior toilet floor, base, and wall ceramic tile applications.
 - a. Do not seal epoxy grout applications.
 - 2. Seal per manufacturer's recommendations.

3.7 PROTECTION

- A. Protect finished installation under provisions of Section 01 50 00.
- B. Provide non-staining protective coverings for all tile in traffic area.
- C. Remove and replace any products that are cracked, scraped, or otherwise damaged after installation and before acceptance by Owner.

3.8 FIELD QUALITY CONTROL

- A. Tolerances
 - 1. Grout joint alignment with adjacent edge: 1/8" in 10 feet.
 - 2. Row and column alignment: 1/8" in 10 feet deviation.
 - 3. Alignment with adjacent tile: 1/16" +/-.
 - 4. Level, plane and/or vertical: 1/8" in 10 feet deviation.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Suspended metal grid ceiling system, including systems designated as a component of a fire rated assembly.
- B. Acoustical Panels, including systems designated as a component of a fire rated assembly.
- C. Acoustical Tiles.
- D. Perforated Metal Acoustical Panel.
- E. Perimeter Trim.
- F. Work may be required to be coordinated with other sections

1.2 REFERENCES

- A. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E 580 Installation of Ceiling Suspension Systems for Acoustical tile and Lay-in Panels in areas Subject to Earthquake Ground Motions
- C. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- D. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- E. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- F. ASTM E 1264 Classification for Acoustical Ceiling Products.

1.3 SUBMITTALS

- A. Provide submittals under provisions of Section 01 33 00, "Submittal Procedures".
- B. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
- C. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
- D. Shop Drawings: Indicate on shop drawings, grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system, and complete suspension system details. Layout and details of acoustical ceilings. Show items coordinated with or supported by the ceilings.
- E. Certifications: Provide manufacturer's certification of compliance with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

1.4 QUALITY ASSURANCE

- A. Installer: Company with three years minimum documented experience with projects under the jurisdiction of DSA.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy.
- B. Building areas to receive ceilings shall be free of construction dust and debris

1.6 SYSTEM DESCRIPTION

- A. Installed System: Conform to ASTM C635 and C636.
- B. Ceiling Suspension System complying with requirements of Chapter 16A, Part 2, Title 24, CCR, including 1615A.1.1.6, modifications to ASCE 7, Section 13.5.6 and DSA 25.2-13.

1.7 SEQUENCING/SCHEDULING

- A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Schedule installation of acoustic units after interior wet work is dry.

1.8 WARRANTY

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
 - 1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
 - 2. Grid System: Rusting and manufacturer's defects
 - 3. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems exhibiting growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
- B. Warranty Period:
 - 1. Acoustical panels: Ten (10) year from date of substantial completion.
 - 2. Grid: Ten years from date of substantial completion.

1.9 EXTRA STOCK

- A. Provide extra quantity of acoustic units under provisions of Section 01 77 19.
- B. Acoustical Panel: Provide two (2) unopened boxes of each type of acoustical panel.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2 CEILING SUSPENSION SYSTEM (ICC-ESR-1308)

A. Manufacturer: Basis of Design:

1. CertainTeed Ceilings, or equal. Website: www.certainteed.com/ceilings
2. Acceptable Alternates:
 - a. USG, Donn XL/DXL Heavy Duty. Website: https://www.usg.com/content/dam/USG_Marketing_Communications/united_states/product_promotional_materials/finished_assets/donn-dx-dxl-suspension-system-data-AC3167.pdf
 - b. Chicago Metallic, 1200 15/16" Heavy Duty. Website: <https://sweets.construction.com/Manufacturer/ROCKFON-NST2215/Products/Chicago-Metallic--1200-15-16--Ceiling-Grid-NST504531-P>

B. Series: 15/16" EZ Stab Classic System, heavy duty.

1. Edge moldings: "L" shaped.
2. Free end – CertainTeed seismic clip per ESR-3336.
3. Face Dimension: 15/16 inches.
4. Duty Rating: Heavy Duty per ASTM C635 and ASTM E580.
 - a. Support/Fastening System: Components of size and type as shown in the drawings as required to rigidly secure acoustic ceiling system with maximum deflection of 1/360. Use perimeter attachment clips as required to allow 3/4 inch movement and retain the panel in place.
5. Code Compliance: Comply with applicable portions of Chapter 16A, Part 2, Title 24, CCR, including 1615A.1.16, modifications to ASCE 7, Section 13.5.6.
6. Fire Resistance Rating: Non-rated assembly.
7. Color: Painted finish, White.
8. Compression Strut: Provide vertical compression strut at grid as shown on drawings and per DSA IR 25.2-13.

C. Series: 9/16" EZ Stab Elite Narrow System, heavy duty.

1. Edge moldings: "L" shaped.
2. Free end – CertainTeed seismic clip per ESR-3336.
3. Face Dimension: 9/16 inches.
4. Duty Rating: Heavy Duty per ASTM C635 and ASTM E580.

- a. Support/Fastening System: Components of size and type as shown in the drawings as required to rigidly secure acoustic ceiling system with maximum deflection of 1/360. Use perimeter attachment clips as required to allow 3/4 inch movement and retain the panel in place.
5. Code Compliance: Comply with applicable portions of Chapter 16A, Part 2, Title 24, CCR, including 1615A.1.16, modifications to ASCE 7, Section 13.5.6.
6. Fire Resistance Rating: Non-rated assembly.
7. Color: Painted finish, White.
8. Compression Strut: Provide vertical compression strut at grid as shown on drawings and per DSA IR 25.2-13.

2.3 ACOUSTIC CEILING PANELS:

- A. Manufacturer: CertainTeed Ceilings, or equal. Website: www.certainteed.com/ceilings
- B. Acceptable Alternates:
 1. Armstrong World Industries, Calla High CAC. Website: <https://www.armstrongceilings.com/commercial/en-us/commercial-ceilings-walls/calla-high-cac-ceiling-tiles.html>.
 2. USG www.usg.com, or equal.
- C. Series: Symphony M High NRC. Website: [Symphony® m | High NRC | Mineral Fiber Ceiling Tiles - CertainTeed](#)
- D. ACT-1
 1. Edge: Square
 2. Size: 24 x 48
 3. Fire/Habitability Criteria:
 - a. Fire Resistance Rating: Class A per ASTM E1264, maximum Flame Spread of 25, maximum smoke contributed of 450, UL Labeled
 - b. Noise Reduction Coefficient: 0.70-0.75
 - c. Ceiling Attenuation Class: 35-40
 - d. Light Reflectance: 0.90 (Minimum 0.85).
 4. Finish: Factory applied paint.
 5. Color: White.
- E. ACT-2
 1. Edge: Narrow Reveal Corner Beveled for 9/16" Grid
 2. Size: 24 x 24
 3. Fire/Habitability Criteria:
 - a. Fire Resistance Rating: Class A per ASTM E1264, maximum Flame Spread of 25, maximum smoke contributed of 450, UL Labeled

- b. Noise Reduction Coefficient: 0.70-0.75
- c. Ceiling Attenuation Class: 35-40
- d. Light Reflectance: 0.90 (Minimum 0.85).
- 4. Finish: Factory applied paint.
- 5. Color: White.
- F. Finish: Factory applied paint.
- G. Color: White.

2.4 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify hanger layout will not interfere with other work.
 - 3. In the event of discrepancy, immediately notify the Architect.
 - 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 CEILING GRID INSTALLATION

- A. Install system in accordance with ASTM C635, C636 and E580 as modified by CBC Section 1615A.1.16, including required vertical compression struts.
- B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- C. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- D. Crimp or tightly twist wire ends around wire support. Do not leave ends angled away from line of wire support.
- E. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- F. Where ducts or other equipment prevent the regular spacing of hangers, install independent framing below ductwork or equipment from which hangers may be attached. Hangers are prohibited from being attached to any non-structural building element.
- G. Locate system on room axis leaving equal border units according to reflected ceiling plan.

- H. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions. Where round obstructions occur, provide preformed closers to match edge molding.

3.3 ACOUSTIC UNIT INSTALLATION

- A. Install acoustic units level, in uniform plane, and free from twist, warp and dents.
- B. Install panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
- C. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
- D. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces. Field paint field cut edges exposed to view.

3.4 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.
 - 1. Where approved by Architect, touch up paint may be used to hide minor scratches and nicks in the surface.
- C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.5 TOLERANCES

- A. Variation from Flat and Level Surface: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 60 10

CONCRETE SLAB MOISTURE CONTROL COATING

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Concrete floor preparation.
- B. Water vapor and alkalinity control system at all concrete floors receiving finish flooring products.

1.2. REFERENCES

- A. ASTM D 4541-02 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- B. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.
- C. ASTM F 710-05 – Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- D. ASTM F 1869-04 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.3. QUALIFICATIONS

- A. System Manufacturer
 - 1. Company specializing in manufacturing the products specified in this Section with minimum 5 years experience in materials of like design and application.
 - 2. Representative Projects: System manufacturer shall have installed water vapor reduction systems in a minimum of ten (10) projects of similar scope and complexity over the past five years.
 - 3. Representative Projects: Manufacturer shall provide a list of at least ten (10) projects, certifying successful management of water vapor emission levels of 10 pounds or more for a minimum period of five years.
- B. Installer:
 - 1. Installer: Company specializing in applying manufacturers systems with manufacturers water vapor reduction systems in a minimum of ten (10) projects of similar scope and complexity over the past five years.
 - 2. Installer: Company approved by system materials manufacturer for specified guarantee.

3. Installing Foreman: Individual specializing in applying manufacturers water vapor reduction systems in a minimum of ten (10) projects of similar scope and complexity over the past five years.

1.4. SUBMITTALS

- A. Provide submittals under provisions of Section 01 33 00.
- B. Submit shop drawings indicating procedure for treating joints and cracks in concrete.
- C. Submit product data for system and accessories, including test data indicating compliance with specified criteria.
- D. Submit moisture level test data complying with specified procedures and schedule.
- E. Submit manufacturers and installers qualifications in compliance with this Section.
- F. Submit vapor control system manufacturers representative's written approval of selected finish flooring materials, adhesives and installation methods.
- G. Following installation, submit vapor control system manufacturers representative's written report regarding substrate review and initial installation methods, stating manufacturers approval of substrate and methods.
- H. Submit finish flooring manufacturers representative's written approval of compatibility with finish flooring materials, adhesives and installation methods, including requirements for cementitious topcoats.

- 1.5. 1.4.9. Submit manufacturers certificate of liability insurance by product liability insurance carrier, with minimum "A" rating from Best or equivalent rating system, in the amount of \$5,000,000 per occurrence, and naming the Owner, Architect and General Contractor as co-insured.

1.6. WARRANTY

- A. Provide manufacturers standard, non-prorated written warranty against both material defects and improper installation and complying with the following criteria.
- B. Warranty coverage and exclusions:
 1. Coverage shall protect against delamination of flooring from substrate as a result of moisture vapor penetration or chemical reaction.
 2. Coverage may exclude failure due to flooding of floor, seismic damage occurring after installation, water intrusion due to plumbing leaks, changed conditions resulting in moisture emission levels exceeding those at time of system installation.
 3. Coverage shall not exclude coverage for
 - a. Concrete shrinkage cracks after application.

- b. Non-compatibility with specified admixtures.
 - c. Concrete silicates or resin treatments.
 - d. ACI 201 limitations.
- C. Term: Minimum ten years.
- D. Warranty Remedy at no cost to Owner:
- 1. Replacement of finish flooring material, including removal, materials, labor and all related accessories.
 - 2. Repair or replacement of moisture vapor control system, including cementitious top coating (where required), preparation and installation.

1.7. DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of the General Conditions.
- B. Store and protect products under provisions of the General Conditions.
- C. Store materials in a dry, secure area.
- D. Maintain storage temperatures per manufacturers criteria.

1.8. ENVIRONMENTAL REQUIREMENTS

- A. Maintain minimum 50 degrees F temperature during installation and with 24 hours of installation.
- B. Restrict traffic from area where system is installed for a period of 1 day after installation.

PART 2 - PRODUCTS

1.1. MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

1.2. MOISTURE VAPOR CONTROL SYSTEM – TYPE 1

- A. Manufacturer: Koester, www.koesterusa.com or equal.
- B. Type: One Coat Epoxy resin coating.
- C. Series: Koester VAP 1 pH
- D. System Performance:

1. Moisture Vapor Emission Limit: System capable of reducing emission levels of a maximum of 10 pounds to a maximum of 3.0 pounds per 1,000 square feet tested in accordance with ASTM F1869.
 2. Alkalinity Level: System suitable for installation on slabs exhibiting pH values up to and including 14.0 tested in accordance with ASTM D1308.
- E. Fire/Life Safety/Habitability Criteria
1. Flammability: Provide non-flammable products.
 2. Hazard Rating: Materials used shall be rated non-hazardous under OSHA regulations.
 3. Air Quality Compliance: All products used shall comply with local and federal VOC criteria.
- F. Accessory Products
1. Primers/Joint Detailing: Provide materials as recommended by manufacturer for application.
 2. Cementitious Topcoat: Provide Ardex K-15 by Ardex Engineered Cements, Inc, 100 percent Portland cement based topcoat system or equal as recommended by moisture control system manufacturer and per approved submittal. Use of gypsum or asphalt based systems are not permitted.

1.3. OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

1.1. SURFACE CONDITIONS

- A. Inspection
1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify measured moisture content is within floor sealer and finish flooring material manufacturers' acceptable range.
 3. In the event of discrepancy, immediately notify the Architect.
 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.2. TESTING PROCEDURES

A. Moisture and alkalinity testing

1. Coordinate with moisture testing specified in other Sections.
2. Where values resulting from second set of tests exceed three pounds per 1000 square feet over a 24 hour period, provide vapor control system specified in this Section.
3. Where values resulting from second set of tests do not exceed three pounds per 1000 square feet over a 24 hour period, and at Owners sole discretion, a deductive change order contract adjustment will be made for slab areas not treated.

1.3. SLAB PREPARATION

A. Prepare Concrete Slab Surface.

1. Shotblast or scarify substrates to degree of “roughness” as required by system manufacturer.
2. Acid etching and grinding is not acceptable.
3. Protect adjacent surfaces prior to beginning slab preparations.

B. Crack and joint preparation

1. Following slab shotblasting, rout out all divots, gouges, cracks, expansion joints and control joints in profile as recommended by floor sealer system manufacturer.
2. Vacuum clean all prepared joints.
3. Fill all joints and seal all floor penetrations such as plumbing piping with manufacturer’s urethane sealant.

1.4. FLOOR SEALER SYSTEM INSTALLATION

- A. Clean all floors and apply system in accordance with system manufacturer's instructions and recommendations.
- B. Apply system at coverage rate as recommended by manufacturer. Allow to cure, using ventilation systems as required to accelerate system curing.
- C. Apply cementitious topcoat as required to provide a smooth surface suitable for finish flooring installation. Allow to cure a minimum of 24 hours before installation of finish flooring.

1.5. QUALITY CONTROL TESTING PROCEDURES

A. Floor Finish Adhesives

1. Coordinate with flooring manufacturer and approve all adhesives proposed for use as compatible with vapor control system.

B. Moisture testing

1. Following completion of floor sealer system installation, conduct anhydrous calcium chloride testing per ASTM F 1869 using prepackaged kit systems approved by flooring manufacturer.
2. Provide minimum 3 tests per 1,000 square feet or less, 6 tests for areas 1,000 to 2,000 square feet, with one additional test for each 1,000 square feet in excess of 2,000 square feet.

C. Alkalinity Testing

1. Conduct alkalinity testing of slab surface immediately following removal of calcium chloride test kit, in accordance with ASTM F 710 procedure.

D. Submit testing data, including test location mapping, to Architect prior to beginning flooring installation.

E. Replacement/Repair: Where test results show values in excess of specified limits, repair or replace system to comply with specified criteria at no additional cost to Owner.

1.6. PROTECTION

A. Protect finished installation under provisions of the General Conditions.

END OF SECTION

SECTION 09 61 43

WATER VAPOR EMISSION TESTING

PART 1 - GENERAL

1.1. SUMMARY

- A. Concrete moisture vapor emission and alkalinity testing.
 - 1. Testing is required in all areas scheduled to receive adhesive applied flooring systems.

1.2. RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 05 40 00 - Cold-Formed Metal Framing
- C. Section 07 26 16 - Below-Grade Vapor Retarders
- D. Section 07 92 00 – Joint Protection
- E. Section 09 21 16 - Gypsum Board
- F. Section 09 28 13 - Cementitious Backer Boards
- G. Section 09 30 13 - Ceramic Tiling
- H. Section 09 65 00 - Resilient Flooring
- I. Section 09 68 13- Carpeting
- J. Work may be required to be coordinated with other sections

1.3. SUBMITTALS

- A. Provide submittals under provisions of Section 01 33 00, “Submittal Procedures”.
 - 1. Product data
 - a. Submit manufacturer's technical data sheet /or warranty for each material for use
 - b. Submit manufacturer's installation instructions.
 - 2. Test Data: Submit result of testing, location and interior building conditions during testing period.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify installation/moisture tolerance testing requirements for all flooring types to be installed.

3.2 FIELD QUALITY CONTROL

- A. Acclimate interior conditions to the working environment of the Owner prior to performing the following testing methods and in accordance with system manufacturer recommendations:
- A. Moisture: Perform ASTM F1869 anhydrous calcium chloride testing directly on concrete surface; without damaging installed product at a rate of one (1) test for each 1,000 square foot of floor space.
- B. Alkalinity: Perform ASTM F710 alkalinity testing during retrieval of moisture tests, directly inside dome area by placing several drops of manufacture provided solution to concrete surface. Wait 60-seconds and apply digital LCD pH meter. Record results to the nearest hundredth on final test report.
- C. Repair damage to treatment as needed to meet flooring tolerance.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Resilient sheet flooring – See Sheet A8.1.1 - RFT-1 through RFT-3, LVT-1 through LVT-6.

1.2 RELATED SECTIONS:

- A. Section 03 30 00 - Cast-In-Place Concrete.
- B. Section 09 60 10 - Concrete Moisture Control Coating.
- C. Section 09 61 43 – Water Vapor Emission Testing
- D. Section 09 65 13 - Resilient Base and Transition Strips

3.2 REFERENCES (Current Edition for All Standards Listed)

- A. American Association of Textile Chemists and Colorists (AATCC):
 - 1. AATCC-134 - Static Generation Propensity (Conductive)
 - 2. AATCC-134 - Static Generation Propensity (Dissipative)
- B. American National Standards Institute (ANSI)::
 - 1. ANSI/ESD S7.1 - Standard Test Method for Static Protective Flooring Materials
 - 2. ANSI/ESD S20.20 - Electrostatic Discharge Control Program Standard
- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D2047 – Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine
 - 2. ASTM D4541– Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 - 4. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials
 - 5. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
 - 6. ASTM E662 (NFPA 258) – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - 7. ASTM F137 - Standard Test Method for Flexibility of Resilient Floor Covering with Cylinder Mandrel Apparatus
 - 8. ASTM F141 – Standard Terminology Relating to Resilient Floor Coverings
 - 9. ASTM F150 – Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring

10. ASTM F386 - Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
 11. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
 12. ASTM F925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring.
 13. ASTM F970/F970M - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading
 14. ASTM F 1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing
 15. ASTM F1482 - Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
 16. ASTM F1514 - Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change
 17. ASTM F1515 - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change
 18. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile
 19. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 20. ASTM F1913 - Standard Specification for Vinyl Sheet Floor Covering Without Backing
 21. ASTM F1914 - Standard Test Method for Short-Term Indentation and Residual Indentation or Resilient Floor Covering
 22. ASTM F2055 - Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gauge Method
 23. ASTM F2170 -Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ Probes
 24. ASTM F2199 - Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile After Exposure to Heat
- B. National Fire Protection Association (NFPA):
1. NFPA 253- Standard Method of Test for Critical Radiant Flux of Flooring Covering Systems Using a Radiant Heat Energy Source
 2. NFPA 258 - Recommended Practice for Determining Smoke Generation of Solid Materials

1.3 SUBMITTALS

- A. General – All Products:
1. Provide submittals under provisions of Section 01 33 00, “Submittal Procedures”.
 2. Product data
 - a. Submit manufacturer's technical data sheet, care & maintenance document, submittal and/or warranty for each material and accessory proposed for use
 - b. Submit manufacturer's installation instructions.
 3. Samples:

- a. Submit two samples, illustrating color and pattern for each material specified.
4. Installation:
 - a. See Section 3.3, “Substrate Preparation” - Submit testing data, including test location mapping, to Architect prior to beginning flooring installation.
- B. Closeout Submittals: Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Section 01 77 00 – Contract Closeout and Section 01 78 23 Operation and Maintenance Data. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, , primers, leveling and patching compounds, and adhesives. Verify moisture mitigations systems are compatible with product per manuf. requirements.
- B. Manufacturer Qualifications: Provide resilient flooring materials manufactured in the United States of America by a firm with a minimum of 5 years’ experience with resilient flooring materials of type equivalent to those specified.
 1. Provide resilient flooring products, including wall base, accessories and subfloor preparation products from one manufacturer to ensure color matching and compatibility.
 2. Manufacturer shall be capable of providing technical training and technical field service representation.
- C. Installer Qualifications: Installer must be professional, licensed, insured and acceptable to manufacturer of resilient flooring materials. Project Managers or Field Supervisors must be INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager) for the requirements of the project.
- D. Sustainable Design Requirements:
 1. Vinyl flooring and accessories that are easily cleaned and do not require coatings and stripping or use chemicals that may be hazardous to human health.
 2. Vinyl flooring that is free of materials known to be teratogenic, mutagenic or carcinogenic.
 3. Vinyl flooring that does not contain any halogens.
 4. Vinyl flooring that contains no asbestos.
- E. Applicator: Company specializing in flooring systems with 5 years documented experience, trained and approved by the flooring system manufacturer.
- F. Special Requirements for LVT product:
 1. Have flooring installed by a qualified installer of this type of flooring.
 2. In accordance with the technical instructions in the Installation Instructions, use all the accessories recommended by manufacturer when installing its flooring.
 3. Follow the instructions specified in the most recent version of manufacturer’s Installation Instructions.

1.5 PRE-INSTALLATION CONFERENCES

- B. Pre-Installation Meetings: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 31 19 - Project Meetings.
- A. Pre-installation Testing: Conduct pre-installation testing as follows: [Specify testing (i.e. moisture tests, bond test, pH test, etc)].

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.
- C. Special Requirements for LVT product:
 - 1. Deliver the flooring to the installation site in manufacturer's original packaging. Indicate the project name and handling instructions on the outside of the boxes.
 - 2. Advise the carrier of any damaged material and indicate it on the packing slip.
 - 3. Store the flooring inside, sheltered from extreme hot or cold temperatures. Place the material on a smooth level floor or where there is uniform solid support in a clean, dry well-ventilated area. Unstack the palettes. The long-term storage temperature must be maintained between 18°C (65°F) and 24°C (75°F). Protect adhesive and flooring material from freezing, extreme heat and direct sun exposure.
 - 4. Acclimatize the subfloor, all flooring material and adhesive for 48 hours before, during and after the installation by maintaining the room temperature between 18°C (65°F) and 24°C (75°F). The palettes should be unstacked 24 hours prior to use.
 - 5. Afterwards, maintain the room temperature between 18°C (65°F) and 29°C (85°F). Protect the material from direct sources of heat such as air vents and other types of heaters.
 - 6. Install the flooring after all other finishing work, including painting, have been completed.

1.7 PROJECT CONDITIONS

- A. All Materials
 - 1. Store materials for three days prior to installation in area of installation to achieve temperature stability.
 - 2. Maintain temperature and humidity at service levels or the ambient temperature must remain steady ($\pm 10^\circ$ F) and be between 65° F and 85° F for at least 48-hours prior to, during and after installation.
 - 3. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and after installation.

1.8 MOCKUPS/TEST INSTALLATIONS

- A. Test Installations/ Mock-ups: Install at the project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.
- B. Mock-Up Size: 10 ft. x 10 ft. area, minimum. Mock up can be included in the final installation.
- C. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
- D. Incorporation: Mock-up may be incorporated into the final construction with Owner's approval.

1.9 SEQUENCING AND SCHEDULING

- A. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
- B. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond, moisture tests and pH test.

1.10 WARRANTY

- A. Provide manufacturer's standard limited commercial warranty to cover manufacturing defects.

1.11 EXTRA STOCK

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.
 - 1. Quantity: Furnish quantity of flooring units equal to 5 % of amount installed.
 - 2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra material.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance.

2.2 VINYL COMPOSITION TILE FLOORING – RFT-1 through RFT-3

- A. Manufacturer:

Basis of Design: Armstrong Flooring Inc., 2500 Columbia Avenue, Lancaster, PA 17604,
www.armstrongflooring.com/commercial

Product Representative – Rachel White

Phone – (760) 936-6758. E-mail – rwhite@triwestltd.com

Website Link – VCT [Commercial VCT - Vinyl Composition Tile | Armstrong Flooring Commercial](#)

1. Substitutions per Section 01 25 13 – Product Options and Substitutions
2. Materials:
 - a. Series: Premium Excelon Raffia Stream with Diamon 10 Technology, see Sheet A8.1.1
 - b. Color: See Sheet A8.1.1
 - c. Description: Tile composed of polyvinyl chloride resin, plasticizers, fillers, stabilizers and pigments with colors and texture dispersed uniformly throughout its entire thickness.
 - d. Vinyl composition tile shall conform to the requirements of ASTM F 1066, “Standard Specification Vinyl Composition Floor Tile”, Class 2, through-pattern
 - e. Pattern and Color: in color selected from the range currently available from Armstrong Flooring, Inc.
 - f. Size: See Sheet A8.1.1
 - g. Thickness: 1/8"/0.125 in. (3.2mm)
3. Tile Adhesive:
 - a. For Tile Installation System, Full Spread: Provide Armstrong [S-515 Floor Tile Adhesive] [S-525 BBT® Bio-Flooring Adhesive] [S-700 Floor Tile Adhesive Thin Spread] [S-750 Premium Floor Tile Adhesive] under the tile and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.
 - b. For Tile Installation System, Tile On: Provide Armstrong [S-515 Floor Tile Adhesive] [S-525 BBT® Bio-Flooring Adhesive] [S-750 Floor Tile Adhesive Thin Spread] under the tile over smooth, completely bonded existing resilient flooring and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.
 - c. For Tile High-Moisture Installation Warranty, Full Spread: Provide Armstrong [S-515 Floor Tile Adhesive] [S-525 BBT® Bio-Flooring Adhesive] under the tile and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.

2.3 LUXURY VINYL TILE FLOORING – LVT-1 through LVT-6

A. Manufacturer:

Basis of Design: Armstrong Flooring Inc., 2500 Columbia Avenue, Lancaster, PA 17604,
www.armstrongflooring.com/commercial

1. Product Representative – Rachel White
2. Phone – (760) 936-6758. E-mail – rwhite@triwestltd.com

B. Website Link – LVT [Commercial Luxury Vinyl Tile | Armstrong Flooring Commercial](#)

C. Materials - LVT:

1. Provide Natural Creations with Diamond 10 Technology Luxury Solid Vinyl Tile Flooring manufactured by Armstrong Flooring Inc.
2. Description: A layered construction consisting of a tough, clear, rigid vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a diamond-infused UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
3. Reference specification - ASTM F 1700, "Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface. Meets requirements for size, squareness, thickness, thickness of wear layer, residual indentation, resistance to chemicals, resistance to light and resistance to heat.
4. Pattern and Color: color selected from the range currently available from Armstrong Flooring Inc., see Sheet A8.1.1
5. Size: See Sheet A8.1.1
6. Wear layer thickness: 0.020 (0.5 mm)
7. Thickness: 1/8"/0.125 in. (3.2mm)

C. Adhesive

1. Provide Armstrong S-288 Flooring Adhesive under the flooring and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.
2. Provide Armstrong S-980 adhesive under the flooring and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.
3. Provide Armstrong S-315 Roll Strong™ Adhesive for field areas and S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.
4. Provide Armstrong S-240 Epoxy Adhesive] under the flooring and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.
5. Provide Armstrong S-1000 Flooring Adhesive under the flooring and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.

D. Other Materials:

- a. Subfloor repairs: use a good-quality Portland cement-based compound modified with latex that has a minimal resistance to compression of 246 kg/cm² (3 500 lbs/sq. in.) to fill, smooth or level subfloor imperfections.
- b. Self-levelling underlayment: use a Portland cement-based self-levelling underlayment modified with a polymer that has a minimal resistance to compression of 246 kg/cm² (3,500 lbs/sq. in.).

2.4 ACCESSORY MATERIALS

B. Subfloor Filler, if not otherwise specified:

1. Portland cement based, Ardex, or approved equal.

Website: <http://www.ardex.com/>

2. Verify with flooring material manufacturer recommendations for use of all products listed. Use of gypsum-based filler is prohibited.
- C. Substitutions per Section 01 25 00, "Substitution Procedures".

2.5 RESILIENT BASE FOR LVT

- B. Provide style to fit job conditions and as approved by the Architect.
 1. See Section 09 65 13 - Resilient Base and Transition Strips.

2.6 TRANSITION/REDUCERS/EDGE STRIPS, If Applicable.

- B. Provide style to fit job conditions and as approved by the Architect.
 1. See Section 09 65 13, "Resilient Base and Transition Strips".

2.7 OTHER MATERIALS

- B. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test, etc.).
- B. Visually inspect flooring materials, adhesives and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.
- C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
- D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
- E. Report conditions contrary to contract requirements that would prevent a proper installation to Contractor, Architect and Owner. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.
- G. Ensure installers or installation teams are properly trained per the requirements of all manufacturers listed.
- H. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

1. Verify that surfaces comply with specified tolerances.
 2. Verify concrete floors comply with specified moisture content criteria acceptable to the flooring manufacturer, and do not exhibit negative alkalinity, carbonization, or dusting.
- I. Ensure substrate meets the requirements of ASTM F710 and ASTM F710, where applicable
- J. Provide a secure storage area that is maintained permanently or temporarily at normal operating temperature and humidity conditions between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring, so the flooring contractor can acclimate the flooring materials per manufacturer's instructions.
1. Provide an installation area that is weather tight and maintained either permanently or temporarily at ambient service temperature and humidity.
 2. Ensure areas with direct prolonged exposure to sunlight are protected with protective UVA/UVB restrictive coatings or films.
 3. Areas of the flooring that are subject to direct sunlight through doors or windows should have them covered using blinds, curtains, cardboard or similar for the time of the installation and 72-hours after the installation to allow the adhesive to cure. Note: These areas should be installed using wet adhesives only.
 4. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.

3.2 EXAMINATION

- A. General: Follow guidelines laid out manufacturer installation guidelines for substrate preparation.
- B. Inspect all substrates to ensure they are clean, smooth, permanently dry, flat, and structurally sound. Confirm all areas are properly sealed and acclimated per manufacturer's requirements.
- C. In accordance with manufacturer's installation requirements, visually inspect material for size, color or visual defects prior to installing. Any material that is incorrect or visually defective shall not be installed.
- D. Special Requirements for LVT product:
1. Examine the subfloor before installation to ensure that the surface is clean, dry, smooth, structurally sound and free from foreign substances that may adversely affect adhesion or cause discoloration. Furthermore, ensure that the subfloor is free of paint, varnish, adhesive, oil, grease, solvent and other foreign substances, including treatment compounds, sealers and curing compounds that may adversely affect adhesion or alter the appearance or durability of the rubber flooring.
 2. Verify the surface to ensure there is no powder, scaling or mold. If there is, remove it with a mechanical sander and level with a good-quality cement-based Portland primer.
 3. Slabs that have been either using a curing agent or a sealer will have to be treated to ensure that the adhesion has not been impaired.
 4. Do not install on cement slabs that have been subjected to adhesive chemical abatement, unless an approved remediation system was used afterwards.

5. Report and rectify all unsatisfactory conditions. Do not start flooring installation until all rectifications have been completed.
- E. Special Requirements For ESD Vinyl Tile:
1. Product Limitations: Do not install over LVT, cushioned vinyl, hardwood flooring, cork, rubber, or asphaltic materials. Do not install ESD Vinyl Tile in outdoor areas, residences, in or around commercial kitchens or areas that may be exposed to animal or vegetable fats and oils, grease and petroleum-based hydrocarbons. Do not install in areas that may be exposed to sharp, pointy objects, such as stiletto heels, cleats or spikes.

3.3 SUBSTRATE PREPARATION

- A. See “Submittals”, Section 1.3, “Submittals” for required installation submittal – to be submitted prior to installation of materials.
- B. All work required ensuring substrate or subfloor meets manufacturers’ guidelines are the responsibility of the general contractor. Evaluate existing floor surface. Prepare surface and apply underlayment to all floor surfaces exhibiting the following characteristics:
 1. Cracks, gouges or holes exceeding 1/16 inch in any dimension.
 2. Cracks with adjacent surfaces exceeding 1/16 inch in height.
 3. All expansion, weakened plane, or construction joints.
 4. All surfaces exhibiting rough or abraded texture exceeding 1/16 inch amplitude.
 5. All surfaces with gap exceeding 3/16 inch under 10 foot metal straight edge.
- C. Prepare existing concrete substrate as recommended by manufacturer, including mechanical shot-blasting or equivalent.
- D. Acid etching is not acceptable.
- E. Prepare existing cracks in substrate as recommended by manufacturer.
- F. Apply filler and trowel to leave a smooth, flat, hard surface.
- G. Prohibit traffic from area until filler is cured. Vacuum clean substrate.
- H. Substrates must be free of visible water or moisture, dust, sealers, paint, sweeping compounds, curing compounds, residual adhesives and adhesive removers, concrete hardeners or densifiers, solvents, wax, oil, grease, asphalt, visible alkaline salts or excessive efflorescence, mold, mildew and any other extraneous coating, film, material or foreign matter.
 - A. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with [S-453 Level Strong™ cement based self-leveling compound
 - B. Subfloor Preparation Moisture Mitigation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, mitigate moisture and other defects with Armstrong Flooring S-454 Prime Strong™ acrylic primer for porous substrates and S-455 Prime Strong™ acrylic primer for non-porous substrates] as recommended by the flooring manufacturer

- C. Subfloor Cleaning: The surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers and other foreign materials that might affect the adhesion of resilient flooring to the concrete or cause a discoloration of the flooring from below. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate they must be mechanically removed prior to the installation of the flooring material.
- I. It is recommended that all substrates have a floor flatness of FF32 and/or flatness tolerance of 1/8" in 6' or 3/16" in 10'.
- J. Acclimate all products to be used during the installation in the installation environment prior to installation according to the manufacturers written instructions.
- K. Mechanically remove contamination on the substrate that may cause damage to the flooring material, this includes paint, permanent and non-permanent markers, pens, crayons, etc. Leaving these on the substrate or marking with them on the back of the material could cause bleed through and damage the flooring.
- L. Fill cracks, holes, depressions and irregularities in the substrate to prevent transferring through to the surface of the resilient flooring.
- M. Check panels for sources of discoloration such as contamination from paint, varnish, stain overspray or spills, plumbing sealers, asphalt, heater fuel, markers or potential staining agents such as wood or bark not visible on the surface, edge sealers, logo markings, printed nail patterns and synthetic patches.
- N. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring.
- O. Requirements For Flexco Vinyl Tiles:
 - 1. Use a high-quality Portland cement based-product such as Excelsior installation products provided by Flexco, or equal, approved by manufacturer and Architect.
- P. Concrete pH Testing: Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.
 - 1. Moisture Testing:
 - a. Perform moisture testing per the requirements in ASTM F2170.
 - b. Conduct alkalinity and anhydrous calcium chloride testing using prepackaged kit systems approved by flooring manufacturer. Contractor shall employ an independent testing service or lab for moisture testing procedure, including placement and removal. Testing service shall be acceptable to Architect.
 - c. Provide test at coverage rate required by flooring manufacturer, with minimum of 3 tests/first 1,000 square feet and 1 test per each 1,000 square feet after. Distribute

uniformly throughout building. Prepare map or diagram of test locations in each building.

- d. Conduct one set of tests 60 days prior to scheduled flooring installation. Submit test results to Architect within 48 hours of test receipt.
 - e. Conduct second set of tests 14 days prior to scheduled flooring installation. Submit test results to Architect within 48 hours of test receipt.
2. Alkalinity Testing
 - a. Conduct alkalinity testing of slab surface immediately following removal of calcium chloride test kit, in accordance with ASTM F710 procedure.

Q. For LVT Product:

1. Level all rough surfaces and fill cracks and marks with a Portland cement-based patching compound modified with latex.
2. Mechanically remove all surface contaminants such as paint, oil, grease, varnish, adhesive as well as various other products such as treatment compounds.
3. Measure the humidity and pH levels in the cement in compliance with the following standards before installation:
 - a. ASTM F 2170, Relative Humidity (RH) test using in situ probes. The maximum allowable reading is 95% RH for M95.0 and MS160.
 - b. ASTM F 710, pH levels (test procedure 5.3.1). The readings should be between 8 and 10.
 - c. The ASTM test frequency recommendation is 3 measures for the first 1,000 sq. ft. (92.9 sq. m) and one measure for each additional 1,000 sq. ft. (92.9 sq. m).
4. Ensure Moisture, Relative Humidity and pH tests have all been conducted and measurements meet manufacturer's recommendations.
5. In case of doubt, test the adhesion on the cement subfloor or other surface that will be covered by the flooring. Do the test using the specified flooring and recommended adhesive.

3.4 INSTALLATION – RESILIENT FLOORING MATERIALS – GENERAL REQUIREMENTS:

- A. Install in accordance with manufacturers' instructions and recommendations.
- B. Spread only enough adhesive to permit installation of materials before initial set.
- C. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- D. Install reducer strips at exposed edges or where flooring material changes to another type. Trim reducer width as required to achieve proper thickness at edges of abutting flooring.
- E. Install pattern with all joints aligned.

3.5 INSTALLATION -BASE MATERIAL AND TRANSITION STRIPS

- A. See Section 09 65 13 - Resilient Base and Transition Strips.

3.6 PROTECTION AND CLEANING

- A. Perform initial and on-going cleaning and maintenance according to the latest edition of manuals provided by manufacturer.
- B. Protect newly installed material with construction grade paper or protective boards, such as Masonite or Ram Board, to protect material from damage by other trades. Be sure all construction debris is swept up and removed prior to the protective material being installed and does not get trapped underneath. Limit usage and foot traffic according to the adhesive's requirements. When moving appliances or heavy furniture, protect wall base from scuffing and tearing using temporary floor protection.
- C. Prohibit traffic on floor finish for 48 hours after installation.
- D. Remove excess adhesive from floor, base, and wall surfaces without damage.
- E. Clean up installation area and sweep, dust or wipe material to remove any dirt, dust or debris.
- F. Conduct initial maintenance per the manufacturer's recommended procedures stated in the Maintenance Documents.
- G. Buff floor without use of waxes or sealers in accordance with manufacturer's instructions.
 - 1. Provide Armstrong S-392 Static Dissipative Tile Polish for application as initial and on-going static dissipative maintenance finish

3.7 CLOSEOUT ACTIVITIES

- A. General: Follow all federal, state and local requirements.
- B. Provide closeout documentation as described in Section 1.3, "Submittals"

END OF SECTION

SECTION 09 65 13
RESILIENT BASE AND TRANSITION STRIPS

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Resilient base

1.2. RELATED SECTIONS:

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 05 40 00 - Cold-Formed Metal Framing
- C. Section 09 21 16 - Gypsum Board
- D. Section 09 65 00 – Resilient Flooring
- E. Work may be required to be coordinated with other sections

1.3. REFERENCES

- A. ASTM F1861 – Standard Specification for Resilient Wall Base

1.4. SUBMITTALS

- A. Provide submittals under provisions of Section 01 33 00, “Submittal Procedures”.
- B. Product data
 - 1. Submit product data for resilient base materials and accessories.
 - 2. Submit manufacturer's installation instructions.
 - 3. Provide typical detail of inside/outside corner installation of resilient base.
- C. Samples:
 - 1. Submit two samples, illustrating color and pattern for each material specified.
- D. OPERATION AND MAINTENANCE DATA
 - 1. Submit cleaning and maintenance data under the provisions of Section 01 77 19 – “Close-out Requirements”
 - 1.

1.5. QUALITY CONTROL

- A. Applicator: Company specializing in flooring, including resilient base with 5 years documented experience, trained and approved by manufacturer.

1.6. ENVIRONMENTAL REQUIREMENTS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.

- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.7. EXTRA STOCK

- A. Base: Provide 50 linear feet of base, in each color and style selected, with 4 each matching outside and inside corners, from same run as installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer – Rubber Base:

1. Basis of Design: Burke Flooring, BurkeBase TP, or equal (District Standard)
Website: <http://www.burkeflooring.com/products/wall-base/commercial-wallbase/>
2. Substitutions: Provide per Section 01 33 00, “Submittal Procedures”.
3. Acceptable Alternatives:
 - a. Roppe, 700 Series Thermoplastic Wall Base. Website: <https://roppe.com/700-series-wall-base/>
 - b. Tarkett (formerly Johnsonite), Duracove Thermoplastic Rubber Wall Base – Type TP. Website: https://commercial.tarkett.com/en_US/collection-C001189-duracove-thermoplastic-rubber-1-8-type-tp
4. Materials:
 - a. Material Standard: Comply with ASTM F1861, Type TP, Group 1 (Solid).
 - b. Type: thermoplastic rubber.
 - c. Series: Pinnacle
 - d. Coved Toe.
 - e. Accessories: Provide pre-molded inside and outside corners matching base profile.
 - f. Size: 4 inch high x stock coil lengths
 - g. Adhesives shall be approved by the resilient base manufacturer.

A. Manufacturer – Transition Strips:

1. Transitions/Reducers/Edge Strips:
 - a. Basis of Design: Burke Flooring, Mercer Vinyl Mouldings, as indicated in drawings, or equal (District Standard)
Website: <http://www.burkeflooring.com/products/mouldings-transitions/mercer-vinyl-mouldings/>
 - b. Acceptable Alternatives:
 - 1) Roppe, vinyl transition strips as indicated in drawings.
Website: <http://search.kofflersales.com/roppe-vinyl-transition-strips>

- 2) Tarkett (formerly Johnsonite), vinyl transition strips as indicated in drawings.
Website: https://commercial.tarkett.com/en_US/collection-C000736-reducers
- c. Material: Vinyl
 - 1) Adhesives shall be approved by the transition strip manufacturer.
- A. Other Materials
- B. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection
 1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify that surfaces comply with specified tolerances.
 - b. Verify concrete floors comply with specified moisture content criteria acceptable to the flooring manufacturer, and do not exhibit negative alkalinity, carbonization, or dusting.
 3. In the event of discrepancy, immediately notify the Architect.
 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

- A. Prepare existing cracks in substrate as recommended by manufacturer.
- B. Apply filler and trowel to leave a smooth, flat, hard surface.

3.3 INSTALLATION -BASE MATERIAL

- A. Install in complete lengths, fit joints tight and vertical. Do not piece. Maintain minimum measurement of 18 inches between joints.
- B. Use pre-molded units at all outside and inside corners.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.
- E. Install using a constant level line at top of base.

3.4 PROTECTION AND CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean floor and base surfaces.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Tile Carpeting –

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete.
- B. Section 09 60 10 - Concrete Moisture Control Coating.
- C. Section 09 61 43 – Water Vapor Emission Testing
- D. Section 09 65 13 - Resilient Base and Transition Strips

1.3 REFERENCES

- A. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
- B. Carpet and Rug Institute (CRI) Indoor Air Quality Green Label Testing Program.
- C. Carpet and Rug Institute (CRI) Green Label Indoor Air Quality Test Program.
- D. Bay Area Air Quality Management District (BAAQMD) Rule #51.

1.4 SUBMITTALS

- A. Manufacturer's literature describing products and installation methods. Include manufacturer's Certification of Compliance with fire rating requirements.
- B. Samples:
 - 1. For verification purposes, two full size tiles of each color and pattern selected.
 - 2. 12-inch long sample of carpet accessories.
- C. Layout Drawings: Show layout of each area to be covered for approval of pattern, and any pertinent installation details.
- D. Maintenance Manuals: Printed copies of manufacturer's recommendations for care, cleaning, and maintenance of specified carpet tiles. Manufacturers' representative shall demonstrate on the job the recommended system of maintenance.
- E. Maintenance Materials:

1. Furnish the District with a minimum of 5-percent of each different material and color used in this Project from same dye lot or production run for compatibility with the installed materials.
- F. Furnish materials in securely wrapped packages or factory sealed packing with the manufacturer's standard labels and the material and color designation used in these specifications.
- G. Deliver material to the District's on-site designated storage place, unloaded and positioned in place per District's instructions.
- H. Furnish a signed receipt indicating materials and quantities upon delivery.

1.5 QUALITY ASSURANCE

- A. Fire Hazard Classification: Class I floor finish. Minimum critical flux limit of 0.45-watts/square centimeter when tested in accordance with NFPA 253.
- B. Static electricity generation of installed carpet shall not exceed 3.5 KV at 70-deg. F and 20-percent R.H. for life of carpet tile.
- C. Installer's Qualifications: Installer shall be approved by carpet tile manufacturer and shall have regularly been providing installations of the types required for no less than 5-years.
- D. Visually perceptible deviations in color at sides and end seams shall not be acceptable.
- E. Indoor Air Quality: Carpet tile shall meet or exceed the minimum standards contained in the Carpet and Rug Industry (CRI) Institute consumer information label.
 1. Comply with Carpet and Rug Institute (CRI) Indoor Air Quality Green Label Testing Program.
 2. All carpet tile products shall comply with the VOC limit established by the Carpet and Rug Institute (CRI) Green Label Indoor Air Quality Test Program.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Carpet tile adhesives shall comply with Bay Area Air Quality Management District (BAAQMD) Rule #51. Maximum VOC content shall be 150 g/L.
- B. Carpet tile installed in the building interior shall meet the testing and product requirements of Carpet and Rug Institute's Green Label Plus program.
- C. Indoor Air Quality
 1. Pre-ventilate carpet tile in well ventilated, uninhabited space for a few days prior to installation.
 2. Provide maximum ventilation during installation.
 - a. Isolate area of installation from remainder of building.
 - b. Clean new carpet tile thoroughly with a high-efficiency particulate air (HEPA) filtration vacuum.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store packaged materials in original containers labels intact until time for use, with seals unbroken and store rolls in a flat position. Protect from damage, dirt, stains and moisture.

- B. Do not store carpet tile near products that can off gas harmful substances.

1.8 PROJECT CONDITIONS

- A. Sequencing Schedule: Do not install carpet tiles until building is entirely closed in, wet work and painting is completed, and heating system is in operation.
- B. Use adhesives in strict compliance with manufacturer's recommendations and ventilate area with maximum outside air for a minimum of 48-hours after installation.
- C. Test substrates to ensure that no dusting will occur through installed carpet tile. Apply sealer on porous concrete surfaces where required to prevent dusting.

1.9 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to provide labor and materials to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period. This warranty shall be in addition to and not a limitation of other rights the District may have against the Contractor under the Contract Documents.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
- B. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 13 – Product Options and Substitutions.

2.2 CARPET TILE – See CP-1 through CP-2 on Sheet A8.1.1

- A. Manufacturer:
 - 1. Basis of Design: Tarket, Carpet Tile, or approved equal.
Website - [Tandus Centiva | Tarkett](#)
 - a. Product Representative: Michael Milhous.

Phone - (916) 806-8502, e-mail - Michael.Milhous@tarkett.com

B. CPT-1, Basis of Design:

1. Construction: Stratatec® Patterned Loop
 - a. Construction: Stratatec® Patterned Loop
 - b. Face Weight: 23 oz/sq yd (779.7 g/sq m)
 - c. Gauge: 5/64 (50.4 rows/10 cm)
 - d. Stitches per Inch: 8.1 (31.9 pu/10 cm)
 - e. Tuft Density: 103.7 tufts/sq in (16.1 tufts/sq cm)
 - f. Pile Height Average: 0.156 inch (4.0 mm)
 - g. Pile Thickness: 0.095 inch (2.4 mm)
 - h. Density Factor: 8,716 oz/cu yd (322.5 kg/cu m)
 - i. Fiber System: TDX Nylon
 - j. Dye Method: 100% Solution Dyed
 - k. Fluorine-Free Soil Protection: Eco-Ensure (12.1 Kilotex)
 - l. Primary Tufting Substrate: Synthetic Non-Woven
 - m. Pattern Match: Not Required

2. Backing: ethos® Modular with Omnicoat Technology™
 - a. Total Minimum Recycled Content: 54.7% SCS Certified total 47-75%
 - b. Pre-Consumer: 22.2% SCS Certified
 - c. Postconsumer: 32.4% SCS Certified
 - d. Third Party Certification NSF-140: Platinum SCS Certified
 - e. Cradle to Cradle Certification: Silver (Certification #1904)
Cradle to Cradle Certified™ v3.1
 - f. Product Size: 24" x 24" Tile
 - g. Secondary Backing: 50% Recycled Content
 - h. Intermediate Layer: Fiberglass Reinforced Sealant
 - i. Product Construction: No Delamination per ASTM D-3936
 - j. Secondary Backing Density: 65.0 lbs/cu ft (1041 kg/cu m)
 - k. Secondary Backing Thickness: 0.050 inch (1.3 mm)
 - l. Total Weight: 101.9 oz/sq yd +/-5% (3454.1 g/sq m)
 - m. CRI Green Label Plus Certification: GLP8320

C. CPT-2, Basis of Design:

1. Construction: Accuweave® Patterned Loop
 - a. Face Weight: 24 oz/sq yd (813.6 g/sq m)
 - b. Gauge: 1/12 (47.2 rows/10 cm)
 - c. Stitches per Inch: 8.0 (31.5 pu/10 cm)
 - d. Tuft Density: 96.0 tufts/sq in
 - e. Pile Height Average 0.187 inch (4.7mm)
 - f. Pile Thickness: 0.115 inch (2.9 mm)
 - g. Density Factor: 7,513 oz/cu yd (278.0 kg/cu m)
 - h. Fiber System: TDX Nylon
 - i. Dye Method: 100% Solution Dyed
 - j. Fluorine-Free Soil Protection: Eco-Ensure (15.8 Kilotex)
 - k. Primary Tufting Substrate: Synthetic Non-Woven

1. Pattern Match: Not Required
2. Backing: ethos® Modular with Omnicoat Technology™
 - a. Total Minimum Recycled Content: 54.7% SCS Certified total 47-75%
 - b. Pre-Consumer: 22.2% SCS Certified
 - c. Postconsumer: 32.4% SCS Certified
 - d. Third Party Certification NSF-140: Platinum SCS Certified
 - e. Cradle to Cradle Certification: Silver (Certification #1904)
Cradle to Cradle Certified™ v3.1
 - f. Product Size: 24" x 24" Tile
 - g. Secondary Backing: 50% Recycled Content
 - h. Intermediate Layer: Fiberglass Reinforced Sealant
 - i. Product Construction: No Delamination per ASTM D-3936
 - j. Secondary Backing Density: 65.0 lbs/cu ft (1041 kg/cu m)
 - k. Secondary Backing Thickness: 0.050 inch (1.3 mm)
 - l. Total Weight: 101.9 oz/sq yd +/-5% (3454.1 g/sq m)
 - m. CRI Green Label Plus Certification: GLP8320

2.3 ACCESSORIES:

- A. Crack Filler: Latex base type.
- B. Adhesives: Provide type and brands of solvent free water-resistant adhesive as recommended by manufacturer of carpet tiles for conditions of installation. Adhesives shall allow slab moisture content up to 10 lbs. Provide adhesive warranty for slab moisture failure.

2.4 RESILIENT BASE FOR TILE CARPETING

- A. Provide style to fit job conditions and as approved by the Architect.
 1. See Section 09 65 13 - Resilient Base and Transition Strips.

2.5 TRANSITION/REDUCERS/EDGE STRIPS, If Applicable.

- A. Provide style to fit job conditions and as approved by the Architect.
 1. See Section 09 65 13 - Resilient Base and Transition Strips.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive carpet tiles and verify that surfaces are suitable for installation.
- B. Test concrete floors for moisture with suitable moisture meter. Moisture shall not exceed 10 lbs.
- C. Do not begin installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Subfloor:
 1. Prior to installation, repair minor floor irregularities and thoroughly clean floor, leaving no dirt or grit.

2. Fill cracks exceeding 1/16-inch in width with crack filler and sand smooth.
3. Confirm compatibility of adhesive with sealers or curing agents on concrete floors.

3.3 INSTALLATION

- A. Apply carpet tiles in strict accordance with manufacturer's instructions using the peel-and-stick method of installation.
- B. Cut evenly along walls, cut and fit evenly around projections, corners, pipes, electrical outlets, floor air or heating elements, and trim strips.
- C. Securely fasten carpet edging strips to floor wherever carpet tiles meet different floor material and no threshold or other divider is noted.
- D. Extend carpet tile materials under all open-bottomed and raised-bottom obstructions, and under removable flanges of obstructions. Extend carpet tiles into closets and alcoves of rooms indicated to receive carpeting, unless another material is specifically identified to be used in that space. Carpet tile shall be installed under all movable furniture and equipment.
- E. Finish installation shall be free from visual defects.
- F. The District's Representative may review carpet tile scraps and retain any he chooses. Remove remainder of scraps from site.
- G. Leave carpet, base and walls clean and free from stains, blemishes and other foreign material- Remove loose threads and vacuum clean.
- H. Installation shall not receive furniture or heavy traffic for 48-hours after installation.

3.4 CLEAN UP

- A. After completion of the carpet tile installation, remove all waste and excess materials, tools and equipment. The complete installation shall be thoroughly vacuumed, using an upright, commercial grade, beater type cleaner, and left in a clean condition. Provide all necessary temporary protection required.

3.5 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with the Applicable provisions of Section 01 74 19, "Construction Waste Management and Disposal", including, but not limited to:
 1. All scraps of unused material shall be reclaimed and recycled by the carpet tile manufacturer. Include a detailed confirmation of the material received by the manufacturer and documentation that these materials haven recycled into new flooring materials. No incineration of reclaimed materials is acceptable.

END OF SECTION

SECTION 09 70 00
VINYL-COATED FABRIC WALL COVERINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Vinyl wallcovering on new gypsum board. Refer to VWC-1 on Sheet A8.1.2.

1.2 RELATED SECTIONS

- A. Section 09 21 16 - Gypsum Board
- B. Section 09 28 13 - Cementitious Backer Boards
- C. Section 09 91 00 - Painting - Interior and Exterior

1.3 REFERENCES:

- A. ASTM E603 - Standard Guide for Room Fire Experiments

1.4 SUBMITTALS

- A. Provide submittals per Section 01 33 00, "Submittal Procedures"
- A. Submit a sample of each type and color to be installed for the architect's approval.
- B. Submit manufacturer's certification that wallcovering furnished meets or exceeds the architect specification requirements.

1.5 PRODUCT DELIVERY STORAGE AND HANDLING

- A. Deliver vinyl wallcovering and adhesive to the job site in unbroken or undamaged containers and clearly marked with the supplier's identification label. Store vinyl wall coverings in a flat position to avoid damage to roll ends. Store materials in a clean, dry storage area with temperature maintained above 55 Degrees F with normal humidity. **DO NOT CROSS STACK THIS MATERIAL.**

1.6 PROJECT CONDITIONS

- A. Areas where wallcovering will be installed shall have a constant minimum temperature of not less than 60 degrees F for at least seven days prior to and throughout installation period and for seven days thereafter.

1.7 WARRANTIES

- A. Furnish a written warranty against defective workmanship that may develop within one (1) year from date of installation and 5 years against manufacturing defects.

PART 2 - PRODUCTS

2.1 VINYL WALLCOVERING – See VWC-1 on Sheet A8.1.2 for style and color

- A. Manufacturer: Koroseal, Type II Vinyl Wall Covering, or approved equal
 - 1. Contact: Lurline P. Hodnett, CSI, CDT, IIDA, LEED AP, Specification Representative, Phone - (559) 250-2430, LHodnett@koroseal.com. Website Link: <https://koroseal.com/products/wallcoverings/spellbound/chant>
 - 2. Substitutions per Section 01 25 13, Product Options and Substitution
- B. Material:
 - 1. Vinyl Wallcovering shall BE Type II AND meet Federal Specification CCC-W-408A and the CFFA-W-101-D, Quality Standard for Vinyl Coated Fabric Wallcovering. The vinyl wallcovering shall contain mildew inhibitors. Class 2 mildew resistant, with cloth backing; paper backing is not acceptable.
 - a. Total Weight: 21.0 oz PLY
 - b. Roll Width: 53/54 in.
 - c. Gauge: 9 mils
 - d. Fabric: Osnaburg
 - e. Tensile (Minimum): 50 x 55 lb.
 - f. Tear (Minimum): 25 x 25
 - g. Federal Spec: CCC-W-408A, Type II
 - h. CFFA Spec: CFFA-W-101-D, Type II
 - i. Fire Testing: NFPA 101 Life Safety Code
 - j. NFPA A255 (UL 723, CAN S102M) Tunnel Test Class A Rating
 - k. NFPA 286 Corner Burn Test Meets Requirements for Flame Spread, Smoke Developed and Flashover
 - l. UL Labeled and Listed
 - m. Repeat: Vertical – N/A
 - n. Horizontal – N/A
 - o. Match Information – Random Match, Reverse Hang

2.2 BURNING CHARACTERISTICS

- A. The manufacturer shall certify at the time of shipment that the materials furnished meet the published flame spread and smoke development Fire Hazard Classification Rating(s) of those products when tested according to ASTM-E84-16 Tunnel Test.

2.3 UL LABEL

- A. All products shall be UL labeled assuring complete compliance with all specifications and requirements through continuous inspection by UL inspectors.

2.4 FIRE DETECTION CHARACTERISTICS

- A. The vinyl wallcovering shall contain the Early Warning Effect formulation which provides early warning to potential fire conditions. The vinyl wallcovering shall contain thermoparticulating ingredients which, when heated to approximately 300 degrees F, emit a colorless, odorless, vapor that activates ionization smoke detection when installed according to manufacturer's specifications. Evidence of the Early Warning Effect shall be based on the ASTM E603-13 standards guide for room fire experiments.

2.5 PROTECTIVE COATING

- A. The vinyl wallcovering shall have a protective coating applied to its surface to minimize migration of stains into the vinyl and, therefore, offer stain protection from a variety of staining agents and provide greater ease of clean ability.

2.6 ADHESIVE

- A. The adhesive used must be manufacturer's recommended adhesive and must contain mildew inhibitors. When applied to 5/8" Type-X gypsum board, A-848-B adhesive is recommended by manufacturer.

2.7 PRIMERS

- A. The primer used must be manufacturer's recommended primer.

2.8 GYPSUM BOARD FINISH

- A. The recommended finish level before commercial-grade wall covering is applied for final decoration is Level 3. The prepared surface shall be coated with a drywall primer prior to the application of final finishes. See 2.7 Primers.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Installer shall inspect all areas and conditions under which vinyl wallcoverings are to be installed. Installer shall notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation; work will proceed only when conditions have been corrected and accepted by the installer.
- B. Substrate shall be checked with a suitable "Moisture Meter." Moisture shall not exceed 4%.

3.2 SURFACE PREPARATION

- A. Wall surfaces shall be free from defects and imperfections that could show through the finished covered surface.
- B. Sand-finished plaster shall be smoothed cinder or cement blocks shall be plastered, or otherwise rendered smooth and old wallcoverings shall be removed.
- C. For new drywall construction, manufacturer recommended primer should be used before application of wallcovering for ease of future removal when redecorating.
- D. Glossy surfaces shall either be sanded to dull surface or a coat of manufacturer's recommended primer applied prior to installation of wallcovering.

- E. If there is any evidence of mildew, it must be removed, and the wall surface treated to inhibit further mildew growth.
- F. All painted surfaces should be evaluated for the possibility of pigment bleed-through. If there is any possibility, a coat of sealer, recommended by the manufacturer, should be applied before application of the wallcovering.
- G. Do not install vinyl wallcovering over oil-based wood stains as a bleed-through may occur.

3.3 INSTALLATION

- A. Wallcovering shall be installed by experienced workers and contractors in strict accordance with the manufacturer's instructions using vinyl wallcovering adhesive recommended by the manufacturer (WHEAT PASTE SHALL NOT BE USED). It is absolutely imperative that installer read the manufacturer's instruction sheet in each roll before installing the vinyl wallcovering. Permanent building light shall be available for installation.
- B. Installer before cutting shall examine pattern and color and determine that they are the correct pattern and color as specified.
- C. Installer shall install each roll in sequence starting with largest roll number and each strip in same sequence as cut from roll. If pattern is not random, examine for repeat design. Some patterns should be lined up, matched or reversed for best results. If necessary, trim selvage deep enough to assure color uniformity.
- D. After application of three strips, an inspection should be made and if there are any variations in color or pattern which are felt to be excessive, the wallcovering distributor or manufacturer's representative should be notified for his inspection before any further wallcovering is installed.
- E. Always bring material six (6) inches around inside and outside corners being sure to fit into corners to avoid bridging or spanning.
- F. The wallcovering should be smoothed to the hanging surface with a stiff bristled sweep brush or a flexible broad-knife to eliminate air bubbles.
- G. Remove excess adhesive along finished seam immediately after each wallcovering strip is applied. Use of clean, warm water, a natural sponge and clean towels are recommended for this use. It is very important to change water often to maintain cleanliness.

3.4 CLEAN-UP COMPLETION

- A. Upon completion of work, remove surplus materials, rubbish and debris, resulting from the wallcovering installation. Leave areas in neat, clean and order condition.

END OF SECTION

SECTION 09 78 26
FIBERGLASS REINFORCED WALL PANELS (FRP)

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Protective, Prefinished Wall Surfacing, FRP and associated trim.

1.2 RELATED SECTIONS

- A. Section 05 40 00 - Cold-Formed Metal Framing
- B. Section 09 21 16 - Gypsum Board
- C. Section 09 28 13 - Cementitious Backer Boards
- D. Section 09 91 00 - Painting - Interior and Exterior

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00, "Submittal Procedures".
- B. Submit samples under provisions of Section 01 33 00, "Submittal Procedures".
- C. Submit two samples of wall covering 4x4 inch in size illustrating each color, finish, and texture.

1.5 QUALITY ASSURANCE

- A. Applicator: Company specializing in installing wall surfacing with 3 years documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 60 degrees F, unless required otherwise by manufacturer's instructions.
- C. Do not apply adhesive when substrate surface temperature or ambient temperature is below 60 degrees F or relative humidity is above 40 percent.
- D. Maintain these conditions 24 hours before, during, and after installation of adhesive wall covering.
- E. Provide lighting level of 80 ft candles measured mid - height at substrate surfaces.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01 66 00, Product Delivery and Storage.

- A. Inspect materials on site to verify acceptance.
- B. Store and protect products under provisions of Section 01 66 00, Product Delivery and Storage.
- C. Protect packaged adhesive from temperature cycling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.
- B. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance.

2.2 PROTECTIVE WALL COVERING – See FRP-1 on Sheet A8.1.1

- A. Manufacturer - Basis of Design:
 - 1. Marlite, Standard FRP, or approved equal.
Address: 23525 W Eames Street, Channahon, IL 60410
Phone – (815) 467-8600 or (800) 435-0080. Website - www.marlite.com.
 - 2. Type: Prefinished protective wall covering.
 - 3. Series/Style: Standard FRP.
Product Link: <https://www.marlite.com/designer-wall-systems-standard-frp.aspx>
- B. Manufacturer – Acceptable Alternative
 - 1. Crane Composites or equal
Address: 15120 Marquardt Ave, Santa Fe Springs, CA 90670
Phone - (562) 926-7308. Website - www.cranecomposites.com
 - 2. Type: Reinforced polyester resin panel.
 - 3. Series/Style: Glasbord, with Surfaseal finish.
Product Link: <https://www.cranecomposites.com/BP/glasbord.html>
- C. Substitutions: Provide per Section 01 25 00, “Substitution Procedures”.
- D. Materials:
 - 1. Construction:
 - a. Nominal thickness: 0.090 inches thick (embossed)
 - b. Size: 48 inches width by maximum sheet length available, height as shown on drawings.
 - 2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E84. Identify products with appropriate markings of applicable testing agency.

- a. Flame-Spread Index: 25 or less.
- b. Smoke-Developed Index: 450 or less.
- c. Fire/Habitability Criteria:
 - 1) Flame Spread: Class 1 per ASTM E84.
 - 2) Smoke Density: Class 1 per ASTM E84.
 - 3) Listing: UL Classified and Labeled.
3. Chemical and Stain Resistance: In compliance with manufacturers literature.
4. Color: White
5. Finish: Pebbled
- E. Substitutions: Provide per Section 01 25 13, Product Options and Substitutions.

2.3 ACCESSORIES

- A. Accessory Moldings and Sealant:
 1. Provide Marlite PVC trim to match panel color
- B. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 1. Color: Match panels.
- C. Exposed Fasteners: Provide color matched nylon drive rivets recommended by panel manufacturer.
- D. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.
- E. Adhesive: Type recommended by wall covering manufacturer to suit substrate, UL Classified for installation, water-based type. Use of contact adhesive not permitted.
- F. Sealant: Provide color matched silicone sealant. Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Protection".
- G. Adhesive: Type recommended by wall covering manufacturer to suit substrate, UL Classified for installation, water-based type. Use of contact adhesive not permitted.
- H. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.

2.4 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection

1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch per foot.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

- A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.
- B. Verify drywall surfaces are ready to receive panels.
- C. Fill cracks and smooth irregularities with filler; sand smooth.
- D. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation. Apply approved stain blocker to marks which may bleed.
- E. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- F. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- G. Remove electrical, telephone, and wall plates and covers.
- H. Vacuum clean surfaces free of loose particles.
- I. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.
 1. Mark plumb lines on substrate at panel joint locations for accurate installation.
 2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.
- J. Apply one coat of primer/sealer to substrate surfaces. Allow to dry. Lightly sand smooth. Vacuum clean.

3.3 INSTALLATION

- A. Install panels in accordance with manufacturer's instructions. Pre-drill holes for all fasteners.
- B. Provide fasteners and adhesive as recommended by manufacturer.
- C. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- D. Install panels in a full spread of adhesive.
- E. Begin panel layout at center of wall. Install edging and dividers in longest lengths possible. Miter interior corner joints. Butt vertical divider joints into continuous horizontal trim.
 - 1. Install panels equally spaced, joints maximum of 48 inches on center, to height as shown on drawings.
- F. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.
 - 1. Pre-drill oversized fastener holes in panels and center fasteners in holes.
 - 2. Apply sealant to fastener holes before installing fasteners.
- G. Install factory-laminated panels using concealed mounting splines in panel joints.
- H. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface by using roller device recommended by manufacturer.
- I. Provide expansion gap at sheet edges and joints.
- J. Install panels before installation of bases, cabinets, hardware, or items attached to or spaced slightly from wall surface. Do not install wall covering more than 1/4 inch below top of resilient base.
- K. Install trim accessories with adhesive. Do not fasten through panels.
- L. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- M. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- N. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
- A. Install sanitary silicone sealant, clear, as specified in Section 07 92 00, "Joint Protection" at all aluminum moldings. Remove excess sealant and smears as paneling is installed.
- O. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.
- P. Re-install cover plates at electrical devices, HVAC registers, and other finishing items at panel locations.

3.4 CLEANING

- A. Clean wall covering of excess adhesive, dust, dirt, and other contaminants in accordance with manufacturers recommendations.
- B. Replace wall plates and accessories removed prior to work of this Section.

3.5 PROTECTION

- A. Protect finished installation under provisions of Section 01 76 00, "Protecting Installed Construction".

END OF SECTION

SECTION 09 91 00
PAINTING - INTERIOR AND EXTERIOR

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation.
- B. Surface paint and stain finishes as scheduled.
- C. Chemical resistant finish.

1.2 REFERENCES

- A. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications
- C. ASTM D3359 – Standard Test Methods for Rating Adhesion by Tape Test
- D. ASTM D4060 – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- E. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- F. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

1.3 RELATED SECTIONS (Other Sections May Apply)

- A. 05 12 00 - Structural Steel (finishes referenced in section)
- B. 05 12 13 - Architecturally Exposed Structural Steel (finishes referenced in section)
- C. 05 50 00 - Metal Fabrications (finishes referenced in section)
- D. 07 42 13 - Formed Metal Wall Panels (color match for downspouts & trims required)
- E. 07 42 16 - Metal Plate Wall Panels
- F. 07 62 00 - Sheet Metal Flashing and Trim
- G. 08 11 00 - Hollow Metal Doors and Frames
- H. 08 31 13 - Access Doors and Frames
- I. 08 91 19 - Fixed Louvers
- J. 09 70 00 - Vinyl Wall Covering
- K. 09 96 00 - High Performance Coatings
- L. 09 29 00 - Gypsum Board & Cementitious Backerboard

1.4 REGULATORY REQUIREMENTS

- A. Submit manufacturer's certification of compliance with local criteria regarding VOC limits for all applied paints and coatings.

1.5 QUALITY ASSURANCE

- A. Applicator: Company specializing in commercial painting and finishing with 5 years documented experience.
- B. Installing Foreman: Individual specializing in applying specified systems with minimum 10 years documented experience.
- C. Special Inspection Procedures: See this Section.
- D. Pre-installation conference: Convene a pre-installation conference two weeks prior to commencing work of this Section. Provide minimum 2 weeks advance notice to Owner and Architect of scheduled date. Comply with provisions of Section 01 31 00, "Project Management Coordination". Attendance by paint and coating material manufacturer's representative is mandatory. At pre-installation conference, review installation procedures, inspection/testing procedures and coordination required with related work.

1.6 SUBMITTALS

- A. Provide submittals under provisions of Section 01 33 00, "Submittal Procedures".
- B. Product Data: Submit product data of all proposed products, identifying product series, material composition, performance characteristics and sheen.
- C. Submit manufacturer's certificate that products comply with current safety and environmental regulations, including hazardous materials labeling and air quality/VOC regulations
- D. Submit manufacturer's certificate that products are physically and chemically compatible with each other and meet listed ASTM or Federal Specifications.
- E. Where applicable, provide manufacturer's written evaluation of existing paint/coating systems, including directions as to surface preparation and primers compatible with existing systems.
- F. Submit manufacturer's application instructions for each painting system, including surface preparation.
- G. Color Selection procedure:
 - 1. Provide Architect with samples of complete color and sheen range available for submitted products.
 - 2. Based on submitted samples and specified color criteria, Architect will prepare preliminary color schedule for all field applied coatings.
 - 3. Based on preliminary color schedule, submit samples of all coatings, applied on specified substrate. Submit three samples, approximately 8 x 10 inch in size, illustrating each color and sheen scheduled.
 - 4. After review of preliminary color schedule samples, Architect will prepare final color schedule. Where different from preliminary schedule, submit three samples, approximately 8 x 10 inch in size, illustrating revised color and sheen.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01 60 00, "Product Requirements".
- B. Store and protect products under provisions of Section 01 60 00, "Product Requirements".
- C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.

- D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- E. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in an enclosed metal storage container located outside of building, unless required otherwise by manufacturer's instructions.
- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 65 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Prior to beginning preparation and coating application, provide lighting level of 80 foot-candles measured on substrate surface. Where natural lighting does not provide such levels, provide temporary lighting.
- C. Special inspection procedures
 - 1. Reports and Certifications
 - 2. Manufacturers Certification: After field inspection, submit written certification from manufacturer that substrates comply with manufacturers recommendations and are suitable for application, environmental exposure and regulations.
 - 3. Manufacturer's representative shall incorporate daily reports into a weekly certification to Architect, countersigned by IOR and applicator, certifying all work specified in this Section was completed in compliance with contract documents and manufacturers recommendations.
 - 4. Manufacturer's Certification: After completion, submit written certification from coating manufacturer that installation complied with manufacturers recommendations, number of coats and recommended coverage rates.
- D. Manufacturers Inspection Services
 - 1. Manufacturer's representative or manufacturers selected inspection service shall inspect and monitor the installation procedure as specified. The inspection service is subject to Architect's approval.
 - 2. Manufacturer's representative shall inspect substrates prior to installation.
 - 3. Manufacturer's representative shall provide a minimum of 4 hours inspection and direction to Contractor for each phase of installation on each building, including preparation, installation, and touch up.
 - 4. Manufacturer's representative shall conduct tests of completed coatings to determine number of coats applied and dry film thickness. Tests shall be taken at each building of each primary building element (such as coping, door frames, wall surfaces, ceiling surfaces) painted under work of this Section. Tests shall be taken at four random locations as determined by Architect.
 - 5. Provide reports as specified.
 - 6. Independent Inspection

- a. Owner may elect to have an independent service inspect coating thickness and other characteristics to determine compliance with specified criteria.
 - b. Provide complete access to inspection service, and coordinate with all testing required by inspection service.
- E. Extra stock:
1. Provide an unopened five-gallon container of each color and sheen to Owner.
 2. Label each container with color, sheen, and room locations, in addition to the manufacturer's label.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: Specific products listed on Schedule in Part 3 of this Section, are indicated to establish required level of quality, appearance, and performance.
- B. Contacts:
 1. Kelly Moore Paints Product Representative Eric Patricio,
Phone - (650) 610-4211, E-mail - epatricio@kellymoore.com
 2. Tnemec Product Representative – High Performance Coatings
Carl Bowers, Principal Amos And Associates, Inc., Tnemec Company 866-317-3206. E-mail - cbowers@tnemec.com
- C. Architect will consider requests for substitutions under the provisions of Section 01 62 00, “Product Options”.

2.2 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings.
- B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. Accessory Materials: Provide all admixtures, thinners, flow agents and other materials not specifically indicated but required to achieve the finishes specified.

2.3 FINISHES/COLOR

- A. Refer to schedule at end of Section for type of surface finish.
- B. Colors shall be selected by Architect as specified.
- C. Each coat shall be a perceptibly different tint.
- D. Color Range (For Colors Not Selected Or Noted Elsewhere):
 1. Unless noted otherwise, where exterior painting occurs, match existing school color scheme.
 2. Where no color range is specified, provide single color for each item or component.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
3. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
4. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the maximum levels recommended by the manufacturer:
5. In the event of discrepancy, immediately notify the Architect.
6. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.
- B. Correct minor defects and clean surfaces which affect work of this Section.
- C. Shellac and seal marks which may bleed through surface finishes.
- D. Steel Surfaces:
 1. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous.
 2. Bare Steel: Sand and scrape to remove loose primer and rust. Clean surfaces with solvent.
 3. Galvanized steel: Test all galvanized steel surfaces for evidence of chromate conversion treatments or other post-galvanizing applications that are not compatible with paint finishes. Where testing demonstrates presence of such treatment, brush blast or otherwise mechanically abrade the surface as required by coating manufacturer.
- E. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair. Remove dry-wall texture nibs and other protrusions.
- F. Interior Wood millwork and miscellaneous Items: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried. Sand between coats.
- G. Verify weather-stripping at door assemblies is compatible with specified paint finish.
- H. Steel Doors and Door/Window Frames:

1. Provide specified primer at all frames, including frames with fabricators primer system. Comply with criteria specified in this Section.
 2. Prepare frame steel surfaces as required for proper adhesion and appearance of specified finish coat system.
 3. Paint all surfaces of window frames, including surfaces not visible when operable vent portions are in closed position.
- I. Preparation for Window Frame Refinishing:
1. Comply with criteria specified in this Section.
 2. Tape and cover all existing glass surfaces at window frame.
 3. Prepare window frame steel surfaces for refinishing as required for proper adhesion and appearance of specified finish coat system.
 4. At all other existing window frames, sand and feather existing paint finish in place using methods referenced within SSPC SP-2 or SP-3 surface preparation standards. Use of acidic or other corrosive paint removal techniques generating caustic or noxious fumes is not permitted.
 5. Paint all surfaces of window frames, including surfaces not visible when operable vent portions are in closed position.
- J. Copper Surfaces Scheduled for a Paint Finish: Remove contamination by solvent washing. Apply vinyl etch primer immediately following cleaning.

3.3 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.4 APPLICATION

- A. All interior finishes shall be as specified in this section.
- B. Apply products in accordance with manufacturer's instructions.
- C. Do not apply finishes to surfaces that are not dry.
- D. Apply each coat to uniform finish.
- E. The number of coats specified are minimum. Additional coats shall be applied until finish is uniform in color and sheen.
- F. Sand lightly between coats to achieve required finish.
- G. Obtain Owners Representative approval of each coat prior to applying succeeding coat.
- H. Allow applied coat to dry before next coat is applied.
- I. Do not paint over labels at fire rated doors, door or window frames or other fire rated assemblies.

- J. Paint all structural components and surfaces visible through louvers and vents in wall and soffit surfaces.
- K. Steel Doors: Finish all surfaces of doors, including tops and bottoms.
 - 1. Apply paint to non-factory prefinished doors and frames by spray method only.
- L. Exterior surfaces, except as noted in other sections, including concrete, metal fabrications, structural components and metal flashings: Unless noted otherwise, apply paints and coatings as specified below:
 - 1. Unless noted otherwise, do not paint exterior galvanized metals, including railings, steel structural components, all roof flashings and accessories, all plaster trim and accessories, and all mechanical and electrical system components.
 - 2. Apply exterior paint to all roof penetrations visible to the eye from typically occupied locations in the finished project. “Typically occupied” includes those portions of the project visible to a standing person from elevated portions of the site.
 - 3. Apply exterior paint to steel structural components, canopy decking, canopy framing, and miscellaneous fabrications visible to the eye from typically occupied locations in the finished project.
 - 4. Unless designated prefinished on drawings, apply exterior paint to metal roof copings, gutters, downspouts and flashings visible to the eye from typically occupied locations in the finished project.
 - 5. Do not paint exterior galvanized metal handrails and railings.
- M. Apply paint to all other exterior components as specified or shown on drawings.
- N. Paint suspended pipe batten systems with interior finish, applied by spray method. Paint all surfaces of grid members.
- O. Paint all surfaces and building system components above ceiling grid line in single color, contrasting with grid, in system complying with schedule for specific surface or component.

3.5 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment. Paint shop prefinished items exposed to view in non - utility areas.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. At interior and exterior applications, prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, mechanical equipment units, hangers, brackets, collars and supports, except where items are prefinished.
- D. Replace identification markings on mechanical or electrical equipment when painted accidentally.
- E. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with flat black paint, to limit of sight line. Paint dampers, except fire dampers, exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

- F. Paint exposed panels, pedestals, boxes, conduit and related electrical equipment occurring in exterior and interior finished areas.
- G. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

3.6 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. At end of workday remove from building flammable paint, solvents, and reducing agents.
- D. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.7 SCHEDULE

- A. See Exterior Elevations for locations requiring high performance coatings.
- B. See Section 09 24 00, “Portland Cement Plastering” for integral color at exterior cement plaster system. Exterior finishes not specifically covered in those sections shall be covered by the requirements in this section.
- C. For ease of specifying, unless otherwise noted, product numbers of Kelly Moore (District Standard) and Tnemec (For High Performance Coatings) have been used.
 - 1. Basis of Design Manufacturers:
 - a. Basis of Design – Paints Other Than High Performance Coatings - Kelly Moore
 - b. Basis of Design – High Performance Coatings – Tnemec
 - 2. Acceptable Manufacturers – Submittal Required Showing Equivalence to Specified Products as indicated below per Section 01 65 00 “Product Options”:
 - a. Benjamin Moore
 - b. PPG
 - c. Dunn Edwards,
 - d. Sherwin Williams,
 - e. Vista,
 - f. Glidden Professional

3.8 GENERAL REQUIREMENTS:

- A. Exterior Downspouts shall match the color of adjacent wall surfaces.
- B. Paint all exposed concrete at wall base to match dominant wall color (one color for base concrete).

3.9 INTERIOR SURFACES

- A. Gypsum Board - Low Sheen/Eggshell Paint Finish:
 - 1. One coat: KM 971 Acry-Plex Low VOC Interior PVA Primer.

2. Two coats: KM 1010 Premium Professional Low VOC Interior Eggshell.
 - B. Gypsum Board - Semi-Gloss Enamel Finish:
 1. One coat: KM 971 Acry-Plex Low VOC Interior PVA Primer.
 2. Two coats: KM 1050 Premium Professional Low VOC Interior Semi-Gloss.
 - C. Gypsum Board – Flat Finish:
 1. One coat: KM 971 Acry-Plex Low VOC Interior PVA Primer.
 2. Two coats: KM 1005 Premium Professional Low VOC Interior Flat.
 - D. Interior Non-Galvanized Steel Doors and Frames, Ferrous Metal Piping, Structural Steel, Miscellaneous Metal Fabrications, and Related Components:
 1. Solvent clean and rinse with clear water.
 2. One coat primer: KM 5725 DTM Acrylic Primer Finish.
 - a. Note: Verify compatibility of finishes with primers for shop primed frames, if substitution is proposed.
 3. Two Coats: KM 5885 DTM High Performance Acrylic Semi-Gloss Enamel.
 4. Interior structural steel and metal fabrications shall be shop-primed and included in the scope of work for the following sections:
 - a. Section 05 12 00 - Structural Steel
 - b. Section 05 50 00 - Metal Fabrications
 - E. Interior Galvanized Flashings, Ductwork, Electrical Conduit, and Related Components: Egg-shell Enamel Finish:
 1. Solvent clean and rinse with clear water. KRUD KUTTER Metal Clean and Etch
 2. One coat primer: KM 5725 DTM Acrylic Primer/Finish.
 3. Two Coats: KM 1010 Premium Professional Low VOC Interior Eggshell Enamel.
 - F. Wall Preparation For Vinyl Wall Coverings:
 1. One coat sealer: ZINSSER SHIELDZ Universal Wallcovering Primer
- 3.9 EXTERIOR SURFACES, WHERE NOT OTHERWISE NOTED
- A. Exterior Non-Galvanized Metal Fabrications, Steel Doors and Frames, Flashings and Similar Items – Standard Paint:
 1. Etch with phosphoric acid solution and rinse with clear water. KRUD KUTTER Metal Clean and Etch
 2. One coat primer: KM 5725 DTM Acrylic Primer/Finish.
 3. Two Coats: KM 5885 High Performance Acrylic Semi-Gloss Enamel.
 - B. Exterior Galvanized Metals/Flashings – Standard Paint:
 1. Etch with phosphoric acid solution and rinse with clear water. KRUD KUTTER Metal Clean and Etch
 2. One coat primer: KM 5725 DTM Acrylic Primer/Finish.

3. Two Coats: KM 5885 High Performance Acrylic Semi-Gloss Enamel.
- C. Exterior Metal Galvanized Flat Sheet Metal Panels and Other Galvanized Metals With High Performance Coating – For Items noted as “High Performance Coatings” in drawings:
- D. Exposed Exterior Metal Galvanized Ferrous Metal Piping, Flat Sheet Panels, Steel Canopy Members, Miscellaneous Metal Fabrications, and Related Components:
 1. One coat Tnemec Series 115 UniBond DF primer at 2-3 mils DFT. – KM 5725 DTM Acrylic Primer/Finish.
 2. Two coats Tnemec Series 1029 Enduratone Acrylic Polymer at 2-3 mils DFT. - KM 5885 High Performance Acrylic Semi-Gloss Enamel.
- E. Exterior Non-Galvanized Structural Steel, Canopies and Trellises, Metal Fabrications and Other Non-Galvanized Metal Fabrication With High Performance Coating – For Items noted as “High Performance Coatings” in drawings:
 1. Surface Preparation: Tnemec SSPC-SP6/NACE No. 3 Commercial Blast Clean to create a dense, uniform and angular anchor profile of 2.0 mils minimum
 2. Shop or Field Primer: Tnemec Series 94-H2O Hydro-Zinc at 2.5 to 3.5 mils DFT
 3. Intermediate Coat: Tnemec Series L69 Hi-Build Epoxoline II at 4.0 to 6.0 mils DFT
 4. Finish Coat: Tnemec Series 750 UVX at 3.0 to 5.0 mils DFT
 5. Exterior structural steel and metal fabrications shall be shop prepared per Tnemec SSPC-SP6/NACE No. 3 and shop-primed with Tnemec Series 94-H2O Hydro-Zinc or equal and included in the scope of work for the following sections:
 - a. Section 05 12 00 - Structural Steel
 - b. Section 05 12 13 - Architecturally Exposed Structural Steel
 - c. Section 05 50 00 - Metal Fabrications

END OF SECTION

SECTION 09 96 23

GRAFFITI-RESISTANT COATINGS

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Graffiti resistant coating applied to exterior masonry surfaces.

1.2. QUALITY ASSURANCE

- A. Coating Systems Manufacturer: Company specializing in VOC approved graffiti systems with three years minimum experience.
- B. Applicator: Company specializing in application of specified coating, with 3 years minimum documented experience and approved by manufacturer.

1.3. SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Material/Installation Data
 - 1. Provide detailed product description, tests performed, limitations to coating, cautionary procedures required during application, and chemical properties, including percentage of solids.
 - 2. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- C. Mock-Up
 - 1. Coordinate with construction of mock up specified in Division 04.
 - 2. Test a minimum 4 ft. by 4 ft. area on each type of masonry. Use the manufacturer's application instructions. Let test area protective treatment cure before inspection. Keep test panels available for comparison throughout the protective treatment project.
 - 3. District staff shall apply graffiti and remove it in accordance with manufacturer's recommendations.
 - 4. Obtain Owner's approval of results prior to further application.

1.4. ENVIRONMENTAL REQUIREMENTS

- A. Do not apply coating when ambient air and surface temperature is lower than 41 degrees F within 24 hours of application.
- B. Do not apply coating when ambient humidity exceeds 80 percent within 8 hours before or after application.

1.5. EXTRA STOCK

- A. Provide five (5) gallons of specified graffiti removal coating.

PART 2 - PRODUCTS

1.1. MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 13.

1.2. GRAFFITI RESISTANT COATING

- A. Manufacturer:
 - 1. PROSOCO, Inc., 3741 Greenway Circle, Lawrence, KS 66046. Phone: (800) 255-4255; Fax: (785) 830-9797. E-mail: CustomerCare@prosoco.com
- B. Product Series: Sure Klean® Weather Seal Blok-Guard® & Graffiti Control
 - 1. Clear, solvent-based silicone elastomer formulated to weatherproof concrete block and other porous masonry materials and protect treated surfaces from repeated graffiti attacks without altering the natural appearance.
 - 2. Penetrates and fills pores to prevent water penetration through exterior walls exposed to normal weathering.
- C. Characteristics:
 - 1. Composition: Clear, solvent based silicone elastomer, in VOC compliant formulation.
- D. Finish/Color
 - 1. Finish: No sheen or change in substrate.
 - 2. Color: Clear.

1.3. Masonry cleaner

- A. Provide recommended ProSoCo Sure Klean cleaner.
 - 1. Sure Klean® 600 is a general purpose, concentrated acidic cleaner for dissolving mortar smears and construction dirt on brick, tile and concrete surfaces

1.4. Graffiti removal solvent

- A. Provide Defacer Eraser® Graffiti Remover, in quantities specified in Article 3.4.

1.5. OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

1.1. SURFACE CONDITIONS

- A. Inspection

1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify joint sealants are installed and cured.
 - b. Verify surfaces to be coated are cured, dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.2. PREPARATION

- A. Remove loose particles and foreign matter.
- B. Clean surfaces with recommended cleaner. Do not use raw acids.
- C. Scrub and rinse surfaces with water and let dry for minimum 24 hours.
- D. Protect adjacent surfaces not scheduled to receive coating.
- E. If applied on unscheduled surfaces, remove immediately, by approved method.

1.3. APPLICATION

- A. Apply coating in accordance with manufacturer's instructions, as modified for each substrate and site conditions.
- B. Apply at manufacturers recommended rate, from bottom up. Avoid excessive overlapping
 1. Apply using spray equipment, maintaining "wet-on-wet" process, in two pass method. Let first application penetrate masonry for 2-3 minutes. Double pass within 5 minutes of first pass.
 2. Do not over-apply.
 3. Brush out any runs, drips or sags immediately.

END OF SECTION

SECTION 10 11 16

MARKERBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Markerboards

1.2 RELATED SECTIONS:

- A. Section 09 21 16 - Gypsum Board
- B. Section 09 28 13 - Cementitious Backer Boards
- C. Work may be required to be coordinated with other sections

1.3 REFERENCED STANDARDS (Most current edition available)

- A. ANSI A208.1 - Particleboard.
- B. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- D. ASTM E84 –Test Method for Surface Burning and Characteristics of Building Materials.
- E. ASTM C540 – Gloss Test for Porcelain Enamel Steel (Porcelain Enamel Institute PEI-501).
- F. Porcelain Enamel Institute-Performance Specifications for Porcelain Enamel Markerboards.

1.4 SUBMITTALS

- A. Submittals: Provide submittals per Section 01 33 00, “Submittal Procedures”.
- A. Submit shop drawings and product data. Include Material Safety Data Sheets, when applicable.
- B. Indicate on shop drawings, wall elevations, dimensions, joint locations, and special anchor details.
- C. Submit two samples 3x4 inches in size, illustrating materials, finish and color of board surfacing and trim.
 - 1. Include maintenance information on regular cleaning and stain removal.

1.5 QUALITY ASSURANCE

- A. Field measure prior to fabrication to ensure proper fit.
- B. General contractor to maintain proper climate before, during and after installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's instructions for handling and storage of Visual Display Boards.
- B. Store and protect per the provisions of Section 01 60 00, "Product Requirements".

1.7 WARRANTY

- A. Submit manufacturer's "Life of Building" warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, Porcelain-on-Steel Markerboards and Chalkboards are guaranteed for the life of the building
- B. Warranty shall cover replacement of defective Porcelain-on-Steel Markerboards and Chalkboards due to discoloration, excessive fading of color, crazing, cracking or flaking. Warranty does not cover the cost of removal or reinstallation.

1.8 MAINTENANCE

- A. Submit maintenance data under provisions of Section 01 77 19, "Closeout Requirements"

PART 2 - PRODUCTS

2.1 MANUFACTURERS – FIXED MARKERBOARDS

- A. Characteristics of specific products manufactured by are indicated to establish required level of quality, appearance, and performance.
 - 1. Basis of Design:
 - a. Claridge Products and Equipment Co. www.claridgeproducts.com
Phone: (800) 434-4610
 - 1) Model: "Concept" - Dry Erase Whiteboard with Narrow 5/16" Aluminum Frame
Website Link: <https://claridgeproducts.com/products/detail/360/concept-dry-erase-whiteboard-with-narrow-5-16-aluminum-frame>
 - 2. Approved Alternate Manufacturer:
 - a. Platinum Visual Systems - www.pvsusa.com
Phone: (800) 498-2990
 - 1) Model: "Writanium" Markerboard – DTS (Drop-In Tray) Series
Product Website Link: <https://pvsusa.com/product/dts-writanium-markerboards/>

2.2 FIXED MARKERBOARDS - CONSTRUCTION

- A. Fixed Markerboard Construction"
 - 1. Size: Refer to Drawings.
 - a. 48" x 96" product code CP-0408-MB

- b. 48" x 120" product code CP-0410-MB
 2. Writing Surface Face Sheet – Manufactured in accordance with Porcelain Enamel Institute's specification.
 - a. Shall be enameling grade cold rolled steel manufactured from a minimum of 30 percent post-consumer and post-industrial waste. 2.
 - b. Enameling grade steel shall be coated with LCS³ Porcelain Enamel by Claridge Products and Equipment.
 - c. 3-Coat process shall include:
 - d. Bottom Ground Coat – 1.5 to 2.2 mils
 - e. Top Ground Coat – 2.0 to 2.8 mils
 - f. Top Cover (Color) Coat – 3.0 to 4.0 mils
 - g. Firing Temperature: Enamel shall be fired at lowest possible temperatures to reduce steel and porcelain stresses and achieve superior enamel and hardness.
 - h. Color: LCS³ No. 100 White (can be used as a projection surface.)
 3. Writing Surface Core: 7/16" Medium Density Fiberboard (MDF) composed of approximately 90% postindustrial waste.
 4. Writing Surface Backing: Moisture Barrier Back
 5. Factory Framed Markerboards
 - a. Face Sheet: LCS³ porcelain enamel steel Markerboard
 - b. Core Material: Specify 7/16" MDF
 - c. Backing: Moisture Barrier Back
 6. Metal Trim and Accessories:
 - a. Aluminum extrusions with satin anodized aluminum finish; 6063 alloy grade aluminum with T5 tempering in accordance with ASTM B221, and shall have 201-R1 satin anodize finish.
 - b. Marker tray: Standard continuous, solid, blade-type aluminum tray with ribbed section and injection molded end closures at bottom of each markerboard.
 - c. Map rail: Standard continuous 1" map rail with cork insert and end stops at the top of each markerboard and chalkboard.
- B. Finish:
1. Porcelain Enamel: Glass fiber enamel, baked to vitreous surfaces; color as selected from manufacturer's standard range for standard dry marker surfaces.
 2. Aluminum Frame and Accessories: Clear satin anodized finish.

2.3 FABRICATION

- B. Laminate facing sheet and backing sheet to core material under pressure, using manufacturer's recommended adhesive.

- C. Provide factory-assembled visual display boards, except where sizes demand partial field assembly.
- D. Assemble units in one piece without joints, wherever possible. Where required dimensions exceed maximum panel size available, provide two or more pieces of equal length, as indicated on approved shop drawings. Assemble to verify fit at factory, then disassemble for delivery and final assembly at project site

2.4 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3. In the event of discrepancy, immediately notify the Architect.
 - 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

- A. Install markerboards in accordance with manufacturer's instructions.
- B. Where visual display boards must be partly assembled at project site, use factory-supplied H-bar to maintain proper alignment.
- C. Install visual display boards level and plumb, keeping perimeter trim aligned in accordance with manufacturer's recommendations

3.3 CLEANING

- A. Verify that all accessories are installed as required for each unit.
- B. Clean board surfaces in accordance with manufacturer's instructions.
- C. Cover board surfaces with protective cover, taped to frame.
- D. Remove protective covers at Owner occupancy.

END OF SECTION

SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Thermoformed Acrylic Permanent Room Signage
- B. Metal Laminated Acrylic Permanent Room Signage
- C. Permanent Room Signage Types:
 - 1. Permanent Room Identification Signage
 - 2. Restroom Signage
 - 3. Exiting Signage
 - 4. Occupant Load Signage
 - 5. Assistive Listening System Device Signage
 - 6. Exterior Utility Room Identification Signage
- D. Marking and Identification Signage for Fire Walls, Fire Barriers, Etc.
- E. Site Vehicle Control Signage

1.2 RELATED SECTIONS:

- A. Section 10 13 00 – Directories
- B. Section 10 14 19 – Dimensional Letter Signage

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. Comply with signage requirements of the Americans with Disabilities Act 2010 Standards (ADA), as currently amended.
- B. Where different or more restrictive than ADAAG, comply with signage requirements of 2019 CCR, Title 24, California Bldg. Code, Part 2, Volume 1, including amendments, Sections 1009.9, 1009.10, 1009.11, 1010.1.9.7, 1013.4, 11B-213 (, 11B-216, 11B-219 (, 11B-404, 11B-407, 11B-502, 11B-703, and 11B-904.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, “Submittal Procedures”.
- B. Shop Drawings:
 - 1. Indicate sign size, message, and mounting.
 - 2. Identify mounting location and alignment with adjacent construction and features.
- C. Product Data: Provide data on material construction, hardware, and accessories.
- D. Samples:

1. Color range: Submit two brochures or other approved submittal of full color range available for each signage application.
 2. Submit two samples of representative signage illustrating dimensional characteristics, finish and sheen for Architect selection.
 3. Submit samples of representative tactile/braille signage illustrating letter stroke proportions and braille dot size, spacing and characteristics.
 4. Shop Drawings: List sign styles, lettering, locations and dimensions of each interior sign.
- E. Certification:
1. Certification: Accompanying submittal, provide sign fabricator/manufacturers written certification stating signs as designed comply with applicable criteria of ADAAG and Title 24, including letter style, spacing and size.
 2. Prior to installation, provide sign fabricator/manufacturers written certification stating tactile and braille signs comply with specified criteria, including proof-reading requirements.

1.5 QUALITY ASSURANCE, MATERIALS AND FABRICATION TECHNIQUES

- A. Manufacturers shall submit 3 references showing products for projects completed within the last 6 years. Both tactile and non-tactile signage shall be included in the work.
- B. Manufacturer's Two-Year Warranties.
- C. Contractor shall provide labor and materials to repair or replace defective signs as directed by Owner. Defects shall include:
- D. Tactile characters and/or Braille dots which come off or are removed.
- E. Discoloration, wear and scratching off of the surface color.
- F. All signs and sign components, except for damage by mishandling by Owner, including installation by Owner, or vandalism.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect under provisions of Section 01 60 00, "Product Requirements".
- B. Deliver to project site in manufacturer's original, unopened and undamaged packaging. Store in original packaging under protective cover and protect from damage. Handle materials in such a manner as to prevent damage to products or finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance.

2.2 THERMOFORMED ACRYLIC PERMANENT ROOM SIGNAGE:

- A. Acceptable Manufacturers:
 1. Best Sign Systems, Inc.

Company Website - <http://www.bestsigns.com/>

Address: 1202 N. Park Avenue, Montrose, CO 81401

Phone - (970) 243-2378

2. Rowmark Signage Company

Company Website - <https://www.rowmark.com/products>

Address: 3000 Bayport Drive, Suite 200, Tampa, Florida 33607

Phone - (813) 282-8544

3. ASI Sign Systems

Company Website - <https://asisignage.com/>

Address: 8181 Jetstar Drive, Suite 100, Irving TX 75603

Phone - (800) 274-7732

4. Vomar Architectural Signage and Graphics

Company Website - <http://vomarproducts.com/>

Address: 7800 Deering Ave. Canoga Park, CA 91304

Phone - (818) 610-5115

5. Or equal. Substitutions: Provide per Section 01 25 00, "Substitution Procedures"

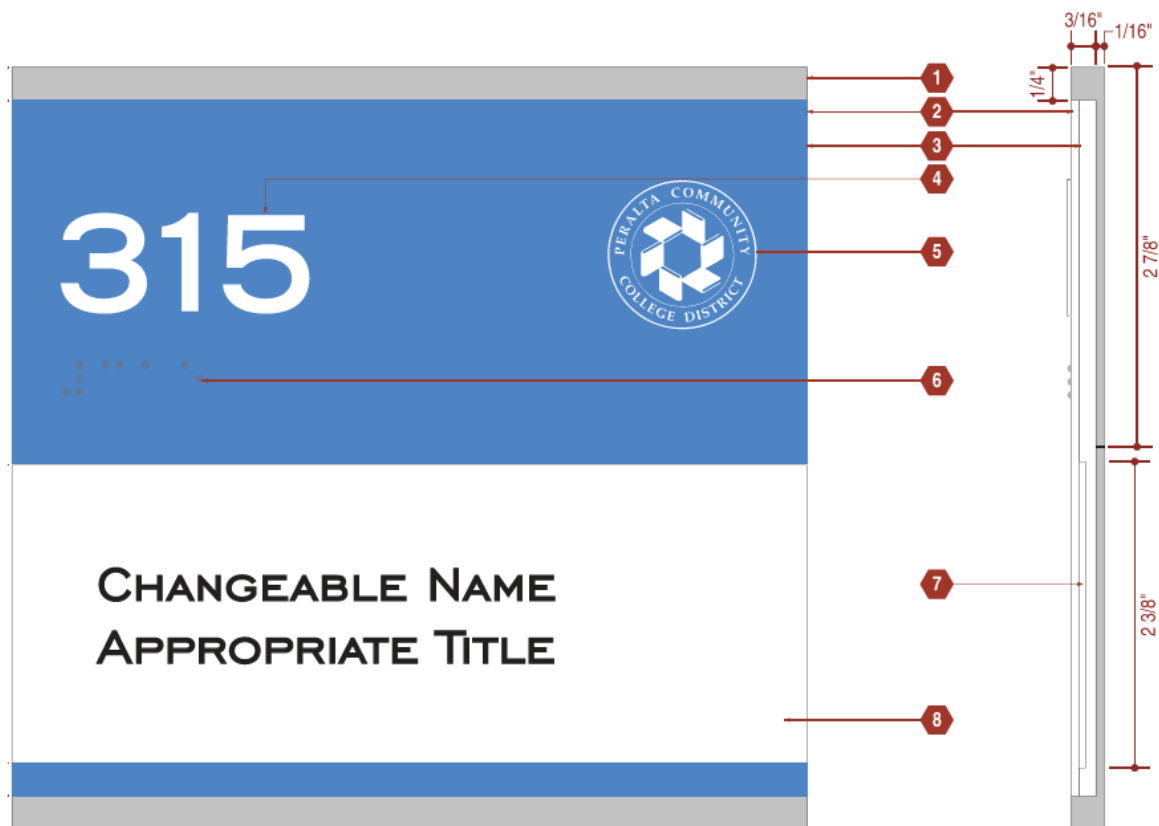
- B. Type: Manufacturer's standard monolithic tactile plaque constructed utilizing a thermoforming process, which provides a fully homogeneous plaque sign. The sign body, face, raised text and Braille shall be compression molded to form a single dimensional component that results in a sign surface that exhibits a toughness that resists scratching, cracking, gouging and graffiti.
- C. Material: 1/8" Extruded Clear Acrylic for all signage, except restroom signage, which is required to be 1/4" thick. Polished beveled edges. Size and shape as shown on drawings.
- D. Text Size, Design, Style Criteria:
 - 1. Letter Style: Non-tactile characters (letters, numbers and symbols) shall be upper case Trade Gothic LH Bold Extended, unless otherwise shown in Drawings.
- E. Color: Provide signs with two colors as selected by Architect from manufacturers standard color line.
 - a. Background: Color 1, selected from standard color range.
 - b. Message: Color 2 selected from standard color range.
- F. Additional Requirements: See Paragraph 2.5 for additional materials and construction requirements.

2.3 DISTRICT STANDARD SIGNAGE EXAMPLE COLOR AND FEATURES

- 1 5 3/4" Tall x 6" Wide x 1/4" Deep Alumium Bracket (Frame)
 2 parts each 2 7/8" Tall (1 Top & 1 Bottom)
 Wall Thickness: 1/16"
 Finish: Sandblasted
- 2 5 1/4" Tall x 6" Wide x 1/16" Backpainted Acrylic
 Laminated to Face of 1/8" Backpainted Acrylic Panel
 2 1/4" Tall x 6" Wide Clear (Masked) Insert Window
 Edges: Flame Polished
 Color: School Specific PMS (Shown in PMS 2727C)
- 3 5 1/4" Tall x 6" Wide x 1/8" Backpainted Acrylic Panel
 Color: School Specific PMS (Shown in PMS 2727C)
- 4 3/4" Tall Applied ADA Room Number
 Font: Trade Gothic LH Bold Extended
 Color: White
- 5 1 1/8" Tall Reverse Engraved Logo w/ Fill
 Logo: School Specific
 Color: White
- 6 California Grade II Bead Braille
 Color: Clear
- 7 2 3/8" Tall x 6" Wide x 1/16" Routed for Paper Insert
 Includes 1/16" Top & Bottom Margin to Cover Edge of Insert
- 8 2 5/16" Tall x 6" Wide White Paper Insert
 1/4" Tall Digitally Printed Text
 Font: Engraver's Gothic Bold
 Font Color: Black



Alameda - Reflex Blue



2.4 PERMANENT ROOM SIGNAGE TYPES:

A. Permanent Room Identification Signage:

1. Basis of Design:
 - a. Acceptable Manufacturers: All manufacturers listed under “Permanent Room Signage”, this Section, or equal.
 - b. Provide permanent room signage at locations shown on drawings. Locate as described in this Section and in drawings.
 - c. At exterior entrance doors, provide additional symbol of accessibility, where required, per Drawings.

B. Restroom Signage:

1. Basis of Design:
 - a. Acceptable Manufacturers: All manufacturers listed under “Permanent Room Signage”, this Section, or equal.
 - b. Provide restrooms signs at locations shown on drawings. Provide signage and symbols as described in this Section and locate per this Section and as shown in Drawings.
 - c. Pictograms: See Permanent Room Signage, this section for room identification signs (text descriptors) located adjacent to restroom doors. Provide a pictogram above the room identification sign per CBC Section 11B-706.6, for Men’s/Boy’s and Women’s/Girl’s restrooms.
 - d. Restroom Door Symbols: Provide door mounted signs per CBC Section 11B-216.8.1, as noted below. Do not put tactile and braille message on this sign type.
 - 1) Men’s/Boy’s Gender Symbol: See CBC Section 11B-703.7.2.6.1 for required signage shape and size. The color of the triangle symbol shall contrast with the color of the door or surface.
 - 2) Women’s/Girls’s Gender Symbol: See CBC Section 11B-703.7.2.6.2 for required signage shape and size. The color of the circle symbol shall contrast with the color of the door or surface.
 - 3) All Gender Symbol: See CBC Section 11B-703.7.2.6.3 for required signage size. the color of the triangle symbol shall contrast with the color of the circle symbol, either light on a dark background or dark on a light background. The color of the circle symbol shall contrast with the color of the door or surface on which the combined circle and triangle symbol is mounted, either light of a dark background or dark on a light background.

C. Exit Signage:

1. Basis of Design:
 - a. Acceptable Manufacturers: All manufacturers listed under “Permanent Room Signage”, this Section, or equal.

- b. Per CBC Sections 1013.1 and 1013.4, provide exit signage at all required exit door locations, per plans. These signs shall comply with CBC Sections 11B-703.1, 11B-703.2, 11B-703.3 and 11B-703.5.

D. Occupant Load Signage

1. Basis of Design:

- a. Acceptable Manufacturers: All manufacturers listed under “Permanent Room Signage”, this Section, or equal.
- b. Location and Message: Per CBC Section 1004.9 and Title 19, Section 3.30, every room or space that is an assembly occupancy shall have the occupant load of the room or space posted in a conspicuous place, near the main exit or exit access doorway from the room or space. Signs to read "- XXX". Occupant load number shall be determined by Architect.
 - 1) Occupant load signs are not required to have Braille.
 - 2) Color: Provide signs with two colors as selected by Architect from manufacturers standard color line.
 - 3) Background: Color 1, selected from standard color range.
 - 4) Message: Color 2 selected from standard color range.

E. Assistive Listening Device Signage:

1. Basis of Design:

- a. Acceptable Manufacturers: All manufacturers listed under “Permanent Room Signage”, this Section, or equal.
- b. Provide signs at assembly areas, where shown on drawings, in an area visible to all points in room, indicating availability of assistive listening devices in compliance with CBC Section 11B 216.10 and 11B-705 and 2010 ADA Section 216.
- c. In addition, provide message on sign stating, “CONTACT RECEPTION DESK, THIS BUILDING, TO MAKE ARRANGEMENTS FOR ACCESS TO LISTENING DEVICE.”
- d. Braille is not required at these signs.

F. Exterior Utility Room Signage:

1. Basis of Design:

- a. Acceptable Manufacturers: All manufacturers listed under “Permanent Room Signage”, this Section, or equal.
- b. Provide exterior utility room signage as shown on drawings, compliant with CBC 11B-216.3 and 11B-703.5. Provide spanner head vandal resistant fasteners, spacers and all required mounting components. Signs shall include, but not necessarily limited to, signs with the following message:
 - 1) "Hazardous Materials"
 - 2) “Gas Shut-off Valve ”

- c. Braille not required at these rooms per CBC Section 11B-203.5.

Platform Lift Signage:

2. Acceptable Manufacturers: ComplianceSigns.com, Item No. RRE-27702, 6” x 6” acrylic sign with pictogram, letters and wording per CBC Sec. 11B-410.8, with non-glare finish or equal.

Product Website Link: <https://www.compliancesigns.com/pd/square-blue-adano-freight-sign-with-wheelchair-rre-27702-white-on-blue>

2.5 GENERAL BUILDING SIGNAGE REQUIREMENTS, MATERIALS AND CHARACTERISTICS

A. Exceptions To CBC Chapter 11B Provisions:

1. Per CBC Section 11B-216.1, Exception 1, building directories, menus, seat and row designations in assembly areas, occupant names, buildings addresses and company names and logos shall not be required to comply with Section 11B-216 requirements listed below.
2. Per CBC Section 11B-203 (General Exceptions), signage is not required to comply with the accessible signage provisions of Chapter 11B, listed in this Section for the following areas:
 - a. Areas raised primarily for purposes of security, life safety, or fire safety as defined in CBC Section 11-203.3.
 - b. Limited access spaces as defined in CBC Section 11B-203.4.
 - c. Machinery spaces -spaces frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment, such as mechanical rooms, electrical or communications equipment rooms, etc., as defined in CBC Section 11B-203.5.
 - d. Single occupant structures below grade or elevated above standard curb height, as defined in CBC Section 11B-203.6.
 - e. Raised refereeing, judging and scoring areas, except at floor-level entry points, where provided as defined in CBC Section 11B-203.10.

B. Sign Messages and Requirements:

1. See Drawings for locations and types.

C. Text Size, Design, Style Criteria per CBC Sections 11B-216, 11B-703.2 and Table 11B-703.5.5:

1. Type styles of characters on all signs which identify, direct to, or give information about facilities and their use shall not be italic, oblique, or decorative in style.
2. Characters required to be tactile shall be San Serif.
3. Character height: 5/8 inch minimum, maximum 2 inch height based on the height of the uppercase letter “I”, raised 1/32 inch minimum and a maximum of 1/16 inch from the background.
4. Character proportion: Width of uppercase letter “O” is 60 percent minimum and 110 percent maximum of the height of the uppercase “I”.
5. Character stroke proportion: Provide stroke thickness of the uppercase “I” shall be 15 percent max. of the heights of the character.
6. Upper case letters shall be 1 inch high (unless otherwise shown on Drawings, maximum 1

- 1/4 inch high).
7. Height of lower case letters (where shown on Drawings) shall be proportional to height of upper case letter.
 8. A minimum of 1/8" space between the top surfaces of adjacent characters measuring between the two closest points shall be provided.
- D. Braille Criteria: Braille shall be in contract (Grade II) and shall comply with Sections 11B-703.3 and 11B-703.4.
1. All Braille shall be fabricated by a method which produces a rounded or domed dot shape. All Braille dots shall be solid or filled from behind so they cannot be crushed or indented
 2. Dimensions and capitalization: Braille dots shall comply with table 11B-703.3.1 The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials and acronyms.
 3. Position: Braille shall be centered directly below the corresponding text in a horizontal format, flush left or centered. If text is multiline, Braille shall be placed below the entire text. Braille shall be separated 3/8 inch minimum and 1/2 inch maximum from any other tactile characters and 3/8 inch minimum from raised borders and decorative elements.
- E. Design sign with room number on first line, room name on second, braille message on third line. Center all copy. Provide minimum 1/2 inch clear space all around braille image.
- F. Finish/Contrast/Color:
1. Finish: Provide signs with matte, non-glare finish, with a maximum 11-19 degree gloss on 60 degree dosimeter.
 2. Contrast: Provide signs with minimum light to dark contrast between background and message of 70 percent.
 - a. International Symbol of Accessibility: See CBC Section 11B-703.7.2.1 for required signage requirements. White symbol on Federal Blue background.
 - b. Finish System: Acrylic polyurethane coating system, VOC approved, complying with glare finish criteria.
- G. Mounting:
1. Location: Locate signs per CBC Section 11B-703.4
 - a. Sign shall be located alongside the door at the latch side. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right-hand door. Where there is no wall space at the latch side of the door, signs shall be located on the nearest adjacent wall.
 - b. Signs containing tactile characters shall be located so that a clear floor space of 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degrees open position.
 - c. Exterior Signs: Countersink screw flush with surface. Provide one-way stainless steel tamper resistant screw # 90090A 155 (1.25" minimum, 1" minimum embedment into wall) for wood, masonry or concrete application in expansion shields suitable for substrate and self-drilling tamper resistant pan head pin in head torx (1") #92970A for metal application with fastener anchors as appropriate for wall material.

2. Interior Signs: Unless noted otherwise, provide double stick foam tape mounting, 1/32 inch thick.
 - a. Signs Mounted on Glass Panels: Sign shall be attached to glass with clear silicone adhesive designed to secure sign material to glass (double stick tape with cushion is not permitted). Contractor shall apply sealant around perimeter of sign.
 - b. Where interior and exterior signs are to be mounted, signs shall be the same size (the larger sign size shall dictate the size of the smaller sign) and located “back-to-back”.
 - c. Where only an interior or exterior sign is mounted, a “blank sign” (the same size and color as the sign) shall be installed and located “back-to-back”.
 - d. Verify surfaces with irregular or rough finish have been properly filled and finished to establish flush and lip free installation.
 - e. The Contractor is solely responsible for the identification of the material onto which signs are to be mounted. The Contractor shall furnish and install all materials necessary for the proper installation of each sign.
 - f. Contractor shall notify the Architect of any conflicts between the Drawings, Specifications and the requirements of the CBC and ADA prior to the submission of the Bid Form. No increase of the Contract Sum and no extension of the Contract Time shall be granted for the resolution of CBC, ADA and Contract Documents conflicts.
- H. Fabrication Certification: Prior to installation, provide written certification stating permanent signage has been proofread by Library of Congress certified readers or approved alternate.

2.6 EXTERIOR CAST DIMENSIONAL SIGNAGE

- A. See Section 10 14 19, “Dimensional Letter Signage”

2.7 DIRECTORIES

- A. See Section 10 13 00, “Directories”.

2.8 MARKING AND IDENTIFICATION SIGNAGE FOR FIRE WALLS, FIRE BARRIERS, FIRE SPRINKLER ROOMS, ETC.

- A. FIRE WALLS, FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS, SMOKE PARTITIONS, AND RATED CORRIDORS:
- B. Where required by CBC Section 703.7, where there is an accessible concealed floor, floor-ceiling or attic space, fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations, provide signage identifying the wall type in concealed spaces with letter heights per the provisions of Section 703.7. Signs shall be located a maximum of 15 ft. of the end of each wall and at intervals not exceeding 30 ft. measured horizontally along the wall or partition.

Acceptable Manufacturers, or equal:

1. Fire Wall Signs, Inc.

Website: <http://firewallsigns.com/>

Address: P.O. Box 7216, Wilmington, NC 28406

Phone: (910) 392-4939

Product Website Link: <http://firewallsigns.com/products.asp>

2. My Safety Sign Company

Company Website: <https://www.mysafetysign.com/contactus>

Address: 300 Cadman Plaza West, Suite 1303, Brooklyn, NY 11201

Phone: (800) 952-1457

Product Website Link: <https://www.mysafetysign.com/fire-wall-signs>

3. Substitutions: Provide per Section 01 25 00, "Substitution Procedures"

C. FIRE RISER ROOMS, FIRE EXTINGUISHER SIGNS, ETC.:

Acceptable Manufacturers, or equal:

1. Safetysign.com

Website: www.safetysign.com

Phone: (800) 274-6271

a. Fire Extinguisher Identification Signage:

SafetySign.com, Item No. A5063-cm, 7" x 10" 0.60 double-sided polystyrene plastic sign, with 1" mounting flange, or equal.

Product Website Link: <https://www.safetysign.com/products/11244/fire-extinguisher-2-way-sign?s=st1zskdcchzgpsprzbpn1>

b. Fire Riser Room Signage:

SafetySign.com, Item No. C005-R65 (Custom Order with 2" high letters per CBC Sec. 902.1.1), 18" x 12" 0.55 polyethylene plastic sign, or equal. Compliant with OSHA Standard 1910.1200(c).

Product Website Link: <https://www.safetysign.com/products/147/fire-extinguisher-2-way-sign?s=st1ztf6zsklnzgp4lkzbpn1>

c. Sprinkler Room Directional Signage:

SafetySign.com, Item No. 25676-BL, 10" x 7" 0.55 polyethylene plastic sign, or equal. Compliant with OSHA Standard 1910.1200(c).

Product Website Link: <https://www.safetysign.com/products/10924/sprinkler-room-sign?s=st1zskcy1gzgpm8yzbpfb5>

2.11 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. 3.1.1. Inspection

1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

A. General criteria:

1. Install in accordance with manufacturer's instructions and approved submittals.
2. Coordinate location of all signage with Architect.
3. Install on clean and properly prepared surfaces.
4. Signs shall be installed with edges horizontal and vertical and face plumb.

B. Permanent room, directional and informational signage:

1. Install signs after substrate surfaces receive final finish.
2. Center room identification signage at 60 inches above floor.
3. Sign shall be located alongside the door at the latch side. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right hand door. Where there is no wall space at the latch side of the door, signs shall be located on the nearest adjacent wall.
4. Signs containing tactile characters shall be located so that a clear floor space of 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degrees open position.
5. Where signs are installed in sealant method on glass panels, provide back plate matching sign at opposite side of glass.
6. When sign is installed on window surface or other similar recessed conditions, provide spacer as required to maintain sign face within 3 inches of outermost wall plane.

C. Exterior site, directional and informational signage:

1. Mount at locations as shown on drawings, level and plumb.
2. Coordinate location with Architect.
3. Mount wall mounted signage fasteners in sealant bedding.
4. Where signs are mounted on gate or fence mesh, sandwich mesh between sign and backing panel of same material and color and size as sign. Install using hex bolt, tamper resistant fasteners, mounted through aluminum sleeve/spacer.

5. Mount ground set signs in concrete footing, per Section 03 30 00, "Cast-In-Place Concrete".

3.3 ADJUST AND CLEAN

- A. Clean and Touch-up: Remove all packing and protection blemishes and thoroughly clean and polish all finish surfaces. Restore any marred or abraded surfaces to their original condition by touching up in accordance with the manufacturer's recommendations. Touch-up shall not be obvious.
- B. Defective Work: Remove and replace all defective work which cannot be properly repaired, cleaned or touched-up with no additional cost to the owner.
- C. Protect installed work during the construction period to prevent abuse and damage.
- A. Clean and polish all signage after installation.

3.4 CLEAN-UP

- A. Upon completion of the work of this section, remove all surplus materials, rubbish and debris from the premises.

END OF SECTION

SECTION 10 14 19

DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Dimensional characters.
 - a. Cast dimensional characters.
 - b. Fabricated channel dimensional characters.
 - c. Illuminated, fabricated channel dimensional characters.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, and layout for each sign at least 3"=1'-0"
 - 4. Show locations of electrical service connections.
 - 5. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior fabricated channel dimensional characters , allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces .
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Basis of Design:
 - 1) Viscom
 - b. Alternates (Requires Substitution Request)
 - 1) ASI Sign Systems, Inc.
 - 2) Metallic Arts.
 - 3) WeidnerCA.
 - c. Contact:
 - 1) Carlos Olivardia
Business Development Manager
Viscom Graphics www.viscomgraphics.com
E-mail Carlos.Olivardia@Viscomgraphics.com
Phone - Direct: (727) 536-5655
Phone – Cell: 321-228-4717
 - 2. Character Material: Cast Aluminum, will acrylic inserts.
 - 3. Character Height: As indicated on Drawings .
 - 4. Finishes:
 - a. Integral Aluminum Finish: Black Powder Coated .
 - b. Acrylic Panels: Reflex Blue
 - 5. Mounting: Concealed studs .
- B. Substitutions: Provide per Section 01 25 00, “Substitution Procedures”
 - 1. Illuminated Characters: Backlighted character construction with LED lighting, including transformers, insulators, and other accessories for operability, with provision for servicing and concealing connections to building electrical system. Use tight or sealed joint construction to prevent unintentional light leakage. Space lamps apart from each other and away from character surfaces as needed to illuminate evenly.

- a. Power: As indicated on electrical Drawings 120 V, 60 Hz, 1 phase, 15 A .
- 6. Mounting: Concealed, stainless steel back bar or bracket assembly .
 - a. Hold characters at manufacturer's recommended distance from wall surface.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish stainless steel devices unless otherwise indicated.
 - 3. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
 - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
 - c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 4. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
 - 5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
 - 6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color unless otherwise indicated.
2. Stainless Steel Brackets: Factory finish brackets to match sign background finish unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF DIMENSIONAL CHARACTERS

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 3. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position, so that signage is correctly located and aligned.
- C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION

SECTION 10 21 13.16

PLASTIC LAMINATE CLAD TOILET COMPARTMENTS

PART 1 - - GENERAL

1.1. SECTION INCLUDES

- A. Laminated plastic clad toilet compartments.
- B. Urinal screens.

1.2. REFERENCES

- A. ASTM A 167 - Stainless and Heat - Resisting Chromium - Nickel Steel Plate, Sheet, and Strip.
- B. NEMA LD - 3 - High Pressure Decorative Laminates.

1.3. SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall, floor, and ceiling supports and door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit one complete set of samples of partition panels, 2 x 3 inch in size illustrating panel finish, color, and sheen for Architect selection.
- E. Submit four samples of each color and finish selected.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.4. FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.5. COORDINATION

- A. Coordinate work under provisions of Section 01 31 13.
- B. Coordinate the work with placement of support framing and anchors in wall and ceiling.

PART 2 - PRODUCTS

1.1. LAMINATED PLASTIC TOILET COMPARTMENTS

- A. Basis of Design: Characteristics of specific products manufactured by Bobrick Washroom Equipment, www.bobrick.com, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.
- B. Type: Overhead ceiling mounted laminated plastic toilet compartments and wall hung urinal screens.
- C. Series:
 - 1. Toilet Compartment: Bobrick, Compact Laminate Duraline Series, Overhead ceiling hung.
 - 2. Urinal Screen: Bobrick, Compact Laminated Duraline Series, wall hung.
- D. Construction:
 - 1. Door/Stile/Compartment Panels:
 - a. Stile/Pilaster Panel: Black phenolic – resin core.
 - b. Compartment Panel: Black phenolic-resin core.
 - c. Door Panel: Black phenolic - resin core.
 - d. Finish all compartment components with solidly fused plastic laminate with matte-finish melamine surfaces, colored face sheet Color as selected by Architect from manufacturer's standard palette.
 - 2. Stile/Pilaster Shoe: Formed ASTM A167 type 304 stainless steel with No. 4 finish, with adjustable screw jack welded to leveling bar.
 - 3. Attachments, Screws, and Bolts: Stainless steel, tamper proof type, with threaded inserts.
 - 4. Hardware:
 - a. All hardware shall be ADA compliant, Type 304 stainless steel. Plastic or ZAMAC alloy not acceptable.
 - b. Where manufacturers standard available line does not include comply with specified characteristics, provide hardware supplied from alternate sources.
 - c. Stainless Steel Gravity Hinges, with emergency release. Provide automatic self closing feature.
 - d. Slide door latch with exterior emergency access feature.

- e. Door strike and keeper with rubber bumper.
- f. Coat hook.
- g. Loop style door pull for all doors.
- h. Door Stops at top and bottom of each door panel.
- i. Continuous Channel at pilaster to panel and panel to wall connection.
- j. Urinal screen: Stainless steel mounting bracket, top and bottom.

E. Fabrication:

- 1. Fabricate partitions by forming compartments with finished faces and edges. Apply face sheets prior to edge banding panels.
- 2. Finish all edges of cut - outs.
- 3. Doors and Stiles/Pilasters:
 - a. Thickness 3/4 inch (19mm).
 - b. Door Width, Typical: 24 inches
 - c. Door Width at Semi-ambulatory Compartment: 32 inches minimum clear opening.
 - d. Door Width at Accessible compartment: 32 inches minimum clear opening at door located at end of compartment, 34 inches minimum clear opening at door located on side of compartment, door swing as shown on plans.
 - e. Door Height: 58 inches.
- 4. Panels: 1/2 inch thick (13mm), 58 inches high.

F. Finish/Color:

- 1. Colors shall be selected by Architect from complete laminated plastic color line.
- 2. Stainless Steel: No. 4, Satin.

1.2. OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

1.1. SURFACE CONDITIONS

A. Inspection

1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify correct spacing of and between plumbing fixtures.
 - b. Verify correct location of built-in framing, anchorage and bracing.
 - c. Coordinate with work specified in other Sections to assure proper type and location of blocking and framing required for installation into solid backing. Anchorage using molly bolts or toggle bolts prohibited.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.2. INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Install compartment panel to stile/pilaster and to wall with continuous channel.
- C. Attach panels and pilasters with tamper proof fasteners.
- D. Anchor urinal screen panels to walls with threaded inserts and anchor brackets.
- E. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.
- F. Equip each door with specified hinge system, one door latch, two door pulls, one coat hook and bumper.
 1. Provide accessible compartment doors with pull on both sides, mounted at 34 inches above finish floor to bottom of pull.
 2. Provide slide latch mounted at 39 inches above finish floor.
 3. Mount coat hook at 48 inches above finish floor in accessible compartments. Locate as directed by Architect. Do not mount on door panel.
- G. Install door strike and keeper with door bumper on each pilaster in alignment with door latch.

- H. Replace damaged or scratched materials with new materials. Field touch - up of scratches or damaged finish will not be permitted.

1.3. ERECTION TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation from Plumb: 1/8 inch.

1.4. ADJUSTING

- A. Adjust work under provisions of Section 01 77 19.
- B. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 26 13

CORNER GUARD AND WALL PROTECTION

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Wall protection elements: Corner guards.
- B. Wall protection elements: Wall Panels.

1.2. REFERENCES

- A. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials

1.3. QUALITY ASSURANCE

- A. Applicator: Company specializing in installing wall surfacing and protection components with 3 years documented experience.
- B. Installing Foreman: Individual with 3 years documented experience installing wall surfacing and protection components with 3 years documented experience.

1.4. SUBMITTALS

- A. Provide submittals under provisions of Section 01 33 00.
- B. Product Data
 - 1. Submit manufacturers product data and installation instructions in accordance with Section 01 33 00.
- C. Samples
 - 1. Submit two samples of each wall panel, 4x5 inch in size, illustrating each color, finish, and texture.
 - 2. Submit one sample of each corner guard, 5 inches in length and including end cap/wall return, illustrating each color, finish, and texture.

1.5. DELIVER, STORAGE AND HANDLING

- A. Deliver products to site and store under the provision of Section 01 60 00.

1.6. ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 60 degrees F, unless required otherwise by manufacturer's instructions.
- B. Do not apply adhesive when substrate surface temperature or ambient temperature is below 60 degrees F or relative humidity is above 40 percent.

- C. Maintain these conditions 24 hours before, during, and after installation of adhesive wall covering.
- D. Provide lighting level of 80 ft candles measured mid - height at substrate surfaces.

PART 2 - PRODUCTS

1.1. MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

1.2. METAL WALL PROTECTION

- A. Manufacturer: C/S Group <http://www.c-sgroup.com/>.
- B. Type: Surface Mounted Stainless Steel Sheet.
- C. Characteristics:
 - 1. Material: 16 gauge type 304 alloy .
 - 2. Finish: #4 satin finish, Diamond Plate texture
 - 3. Mounting: Stainless steel wall protection shall be furnished as a complete packaged system, including appropriate mechanical fasteners.

1.3. METAL CORNER GUARDS

- A. Manufacturer:
 - 1. Approved Manufacturers: Manufacturer: C/S Group <http://www.c-sgroup.com/>, American Floor Products Co. Inc. www.afco-usa.com, Pawling Corporation www.pawling.com or equal.
- B. Section is based on products manufactured by C/S Group <http://www.c-sgroup.com/>.
- C. Type: Stainless steel surface mounted 90 degree corner guard.
- D. Model: SCO-8 (CG-1)
 - 1. Size: 90° stainless steel corner guard with 3/16" radius and 3 1/2" standard legs.
 - 2. Material: Type 304 stainless steel, 16 gauge.
 - 3. Accessories: Stainless steel corner guards shall be furnished as a complete packaged system, including appropriate mechanical fasteners.
 - 4. Finish: #4 satin finish.
- E. Model: CO-8 (CG-2)
 - 1. Size: 90° stainless steel corner guard with 3/16" radius and 2" standard legs.
 - 2. Material: Type 304 stainless steel, 16 gauge.

3. Accessories: Stainless steel corner guards shall be furnished as a complete packaged system, including appropriate mechanical fasteners.
4. Finish: #4 satin finish.

1.4. OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

1.1. SURFACE CONDITIONS

- A. Inspection
 1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 3. In the event of discrepancy, immediately notify the Architect.
 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.2. INSTALLATION

- A. Install assembly in accordance with manufacturers instructions.
- B. Use mechanical fasteners to attach to substrate.

1.3. CLEANING

- A. Clean surfaces of completed installation.

END OF SECTION

1.1. SECTION INCLUDES

- A. Concrete floor preparation.
- B. Water vapor and alkalinity control system at all concrete floors receiving finish flooring products.

1.2. REFERENCES

- A. ASTM D 4541-02 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- B. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.
- C. ASTM F 710-05 – Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- D. ASTM F 1869-04 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.3. QUALIFICATIONS

A. System Manufacturer

- 1. Company specializing in manufacturing the products specified in this Section with minimum 5 years experience in materials of like design and application.
- 2. Representative Projects: System manufacturer shall have installed water vapor reduction systems in a minimum of ten (10) projects of similar scope and complexity over the past five years.
- 3. Representative Projects: Manufacturer shall provide a list of at least ten (10) projects, certifying successful management of water vapor emission levels of 10 pounds or more for a minimum period of five years.

B. Installer:

INSTALLER: COM

SECTION 10 28 13
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Toilet Room and Janitor Room Accessories.

1.1 RELATED SECTIONS

- A. Section 05 40 00 - Cold-Formed Metal Framing
- B. Section 09 21 16 - Gypsum Board
- C. Sections 09 28 13 - Cementitious Backerboard
- D. Section 09 30 13 - Ceramic Tiling
- E. Section 10 21 13.16 - Plastic Toilet Compartments
- F. Section 10 28 40 – Electric Hand Dryers
- G. Work may be required to be coordinated with other sections

1.2 SUBMITTALS

- A. Product Data: Manufacturer's product data and installation instructions for each toilet accessory.
- B. Setting Drawings: Furnish setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.

1.3 PROJECT CONDITIONS

- A. Coordinate accessory locations, installation, and sequencing with other work to avoid interference and to assure proper installation, operation, adjustment, cleaning, and servicing.
- B. Ensure wall studs and backing plates are installed as required.

1.4 PROJECT WARRANTY

- A. Furnish manufacturer's written 5-year warranty against silver spoilage of mirrors, agreeing to replace any mirrors that develop visible defects within warranty period.

PART 2 - PRODUCTS

2.1 WASHROOM AND MISCELLANEOUS ACCESSORIES – CONTRACTOR-PROVIDED/
CONTRACTOR-INSTALLED

A. Manufacturers:

1. Approved Manufacturers:

- a. Bobrick – <http://www.bobrick.com/products/washroom-accessories/>

Contact: Local Representative:

College of Alameda Transportation Technology

Issue Date: 05/05/2021

Project No. 20-175

Revision Date:

R.E. Edwards & Associates, Inc.
Pleasanton, CA
Phone (925) 829-2942

2. Acceptable Alternates, Where Noted:
 - a. American Specialties Inc. – www.americanspecialties.com
Contact: Local Representative:
Maurice Scott & Associates, LLC
San Jose, CA
Phone - (408) 278-6936
 - b. Bradley Corporation – <https://www.bradleycorp.com/washroom-accessories-products>
Contact: Local Representative/Dealer:
Pace Supply
Sacramento CA
Phone - (844) 717-8579
 - c. Substitutions per the provisions in Section 01 62 00, “Product Options”

2.2 RESTROOM ACCESSORIES:

A. GB-1 & GB-2 - Stainless Grab Bars:

1. **Approved Manufacturer – GB-1 & GB-2** - Bobrick, 6806 Series, Type 01, Stainless-Steel Grab Bars.
 - a. GB-1 - Bobrick, Model No. 6806 X 42, Type 01, 1 1/4 inch O.D., 42 inch Long, Peened Stainless-Steel Grab Bars, With Concealed Mounting.
 - b. GB-2 – Bobrick, Model No. 6806 X 48, Type 01, 1 1/4 inch O.D., 48 inch Long, Peened Stainless-Steel Grab Bars, With Concealed Mounting.
2. **Alternate – GB-1 & GB-2** - American Specialties Inc. (ASI), 3700 Series, Type 01, Stainless-Steel Grab Bars, Concealed Mounting
 - a. GB-1 - American Specialties Inc. (ASI), Model No. 3700X48, Type 01, 1 1/4 inch O.D., 48 inch Long Peened Stainless-Steel Grab Bars, Concealed Mounting
 - b. GB-2 - American Specialties Inc. (ASI), Model No. 3700X48, Type 01, 1 1/4 inch O.D., 48 inch Long Peened Stainless-Steel Grab Bars, Concealed Mounting
3. **Alternate – GB-1 & GB-2** - Bradley, 812 Series, Type 001, Stainless-Steel Grab Bars, With Concealed Mounting.
 - a. GB-1 - Bradley, Model No. 812-001-42, 1 1/2 inch O.D., 42" Long, 1 1/2 inch Dia., Stainless-Steel Grab Bars, With Safety Grip and Concealed Mounting
 - b. GB-2 - Bradley, Model No. 812-001-48, 1 1/2 inch O.D., 48" Long, 1 1/2 inch Dia., Stainless-Steel Grab Bars, With Safety Grip and Concealed Mounting

B. EHD-1 – Electric Hand Dryer:

1. See Section 10 28 40 – Electric Hand Dryers

C. M-1 - Stainless Steel, Channel-Framed Mirror:

1. **Approved Manufacturer** - Bobrick, Model No. B-1658-1836, Stainless-Steel, Lock Tab, Channel-Frame Mirror, With Tempered Glass.
 - a. Size: 18 inches W x 36 inches high
2. **Alternate** - American Specialties Inc. (ASI), Model No. 600-1836-B, Stainless-Steel, Inter-Lok, Channel-Frame Mirror, With Tempered Glass.
 - a. Size: 18 inches W x 36 inches high
3. **Alternate** - Bradley, Model No. 781-1836-2, Stainless-Steel, Channel -Framed Mirror, With Tempered Glass
 - a. Size: 18 inches W x 36 inches high

D. SCD-1 - Surface-Mounted Toilet Seat Cover Dispenser: OFCI

E. SD-1 –Surface-Mounted Soap Dispenser: OFCI

F. SNV-1 – Sanitary Napkin Vendor:

1. **Approved Manufacturer** - Bobrick, Model No. B-47069 25, Contura Series, Premium Stainless-Steel Sanitary Napkin Disposal Unit.
 - a. Size: 14 3/8” inches W. x 28 3/8” inches H. x 7 1/8 inches D. from face of wall.
 - b. 25 cent coin operation

G. TTD-1 - Stainless Steel Recessed Seat Cover and Toilet Tissue Dispenser:

1. **Approved Manufacturer** – Bobrick, Model No. B-3474 (Men) or B-35745 (Women), Classic Series, Stainless Steel.
 - a. Size: 16 inches . 29 1/4 inches H x 4 inches.
 - b. 4 inches D. recess into wall.

H. TTD-2 - Surface-Mounted Toilet Tissue Dispenser: OFCI

1. **Alternate 1** – Bobrick, Model No. B-4288 Contura Series, Premium Stainless-Steel Surface-Mounted Dual Roll Toilet Tissue Dispenser.
 - a. Size: 6 1/8 inches W. 11 inches H. x 5 5/16 inches D. from face of wall

I. SPW-1 – Sanitary Napkin Disposal Unit:

1. **Alternate 1** - Bobrick, Model No. B-270, Contura Series, Surface Mounted Stainless-Steel Sanitary Napkin Disposal Unit.
 - a. Size: 7 1/2 inches W. x 10 inches H. 3 13/16 inches D.

J. BCS-1 – Baby Changing Station:

1. **Approved Manufacturer** – Bobrick Koala Kare Products, Model No. KB-110-SSRE, Horizontal, Recessed Mounted, Stainless Steel.
 - a. Size: 37 inches W x 33 inches high
 - b. 4 inches D. recess into wall.

K. PTD-1 –Surface-Mounted Paper Towel Dispenser: OFCI

2.3 JANITOR ROOM ACCESSORIES

A. MR-1 – Stainless Steel Mop Rack With Utility Shelf

1. **Approved Manufacturer** - Bobrick Model No. B-239X34, Stainless Steel Mop Rack With Utility Shelf
 - a. Size: 34 inches W X 13 inches high X 8 inches deep
2. **Alternate** - American Specialties Inc. (ASI), Model No. 1315-4, Stainless Steel Mop Rack With Utility Shelf.
 - a. Size: 36 inches W X 6 inches high X 8 inches deep
3. **Alternate** - Bradley, Model No. 9984, Stainless Steel Mop Rack With Utility Shelf.
 - a. Size: 36 inches W X 6 1/8 inches high X 8 inches deep

2.4 TRAP AND PIPING WRAP

A. PW-1 – Accessible Pipe Wrap

1. Basis of Design: Plumberex Specialty Products, Phone - (760) 343-7363
 - a. **Alternate 1** -- Plumberex, Handi-Shield MaXX Soft Under-Lav Insulated Cover
 - b. **Alternate 2** - Plumberex, Pro-Extreme Molded Under-Lav Insulated Cover
2. Pipe Wrap shall comply with CBC Section 11B-606.5 Provide heavy duty security snaps and all required accessory fittings. Provide at all lavatory and sink trap toilet accessory items.

PART 3 - EXECUTION

3.1 INSPECTION

- A.** Check wall openings for correct dimensions, plumbness of blocking or frames, and other preparation that would affect installation of accessories.
- B.** Check areas to receive surface mounted units for conditions that would affect quality and execution of work.
- C.** Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.

3.2 INSTALLATION

- A.** Install toilet accessory units in accordance with manufacturer's instructions, using tamper-proof fasteners. Finish of exposed fasteners shall match accessory item secured. Install units plumb and level, firmly anchored in locations and at heights indicated.
- B.** Secure mirrors to walls in concealed, tamper-proof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer's instructions for type of substrate involved.
- C.** Fit flanges of accessories snug to wall surfaces. Install sanitary sealant in gaps between 90- degree return flanges and finish wall surface after installation.

D. Finish edges of accessories with sealant to avoid water penetration.

3.3 ADJUSTING AND CLEANING

- A.** Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B.** Clean and polish exposed surfaces of accessories in accordance with manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION

SECTION 10 28 40
ELECTRIC HAND DRYERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Electric Hand Dryers as scheduled in this section and as indicated on the Drawings.

1.2 RELATED SECTIONS

- A. Section 05 40 00 - Cold-Formed Metal Framing
- B. Section 09 21 16 - Gypsum Board
- C. Section 09 28 13 - Cementitious Backer Boards
- D. Section 09 30 13 - Ceramic Tiling
- E. Section 10 28 13 – Toilet Accessories.
- F. Division 26– Electrical Sections.
- G. Division 27 – Low Voltage Sections.
- H. Work may be required to be coordinated with other sections

1.3 REFERENCES (Current Edition for All Standards Listed)

- A. ICC/ANSI A117.1 - American National Standard for Accessible and Useable Buildings and Facilities; 2017.
- B. UL, LLC / UL Environment - Product Category Rules (PCR) or Hand Dryers, 2016.
- C. 2019 California Building Code.
- D. 2019 California Electrical Code.
- E. UL Requirements listed within this section.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, "Submittal Procedures".
- B. Product Data: Submit manufacturer's data sheets for each product specified, including the following:
 - 1. Preparation instructions and recommendations
 - 2. Operating instructions and performance.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation instructions and recommendations.
 - 5. Electrical wiring diagrams.
 - 6. Cleaning and maintenance instructions.
 - 7. Replacement parts information.
 - 8. Shop drawings showing dimensions, method of attachment, and required supports.
 - 9. Warranty for review by Architect.
 - 10. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
 - 11. Closeout Submittals:
 - a. Operational manuals/instructions.
 - b. Warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.
- B. Single Source Requirements: To the greatest extent possible provide products from a single manufacturer.
- C. Equipment certified by Underwriters Laboratory, Inc., with UL and ULC labels.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.7 WARRANTY

- A. Provide manufacturer's standard limited warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Manufacturers – Accessible Hand Dryers (Projection Does Not Exceed 4" From Wall Face):

1. **Approved Manufacturer** – World Dryer

Phone – 800-323-0701. Website: www.worlddryer.com.

- a. Substitutions shall comply with the provisions in Section 01 25 00, “Substitution Procedures”.

- B. Acceptable Products:

1. **Approved Manufacturer - Electric Hand Dryer – EHD-1** –World Dryer, Model SLIMdri, Surface-Mounted Automatic Hand Dryer.

2. Type: Low profile, ADA compliant.

3. Mounting: Surface mounted.

4. Electrical rating:

- a. Universal voltage, 110-120/208/220 – 240 VAC, 60 Hz.

5. Motor: Universal brushed type, 5/8 HP, 13,000 RPM with replaceable motor brushes.

6. Electronic controls:

- a. Universal voltage controller, 110-120/208/220-240 VAC, 60Hz with automatic infrared optical sensor. Operates while hands are under blower.

- b. Shut-off in 3 seconds after hands are removed, and within 60 seconds if hands are not removed.

- c. On/Off heating switch.

7. Heater:

- a. Nichrome wire element with automatic resetting thermostat to open when air flow is restricted and close when air flow is resumed.

- b. Heated air temperature: 130 degrees F at 70 degrees F ambient air temperature.

8. Sound level: 69 dBA at 79 inches.

9. Anti-microbial technology: Inhibit growth of bacteria, mold, and fungus extending the dryer's service life.
10. Ingress protection rating: IP23.
11. Cover material: One piece, vandal resistant, stainless steel, brushed finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

2.3 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Coordinate requirements for blocking to ensure adequate means for support and installation of hand dryers.
- D. Coordinate requirements for power supply, conduit, disconnect switches and wiring.

2.4 INSTALLATION

- A. Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
 1. Verify blocking has been installed properly.
 2. Verify location does not interfere with door swings or use of fixtures.
 3. Comply with manufacturer's recommendations for backing and proper support.
 4. Use fasteners and anchors suitable for substrate and project conditions
 5. Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
 6. Conceal evidence of drilling, cutting, and fitting to room finish.

7. Test for proper operation.

2.5 CLEANING AND PROTECTION

- A. Inspect installation to verify secure and proper mounting. Test each dryer to verify operation, control functions, and performance. Correct deficiencies.
- B. Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.
- C. Protect installed dryers until completion of project.
- D. Replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10 41 00
EMERGENCY ACCESS AND INFORMATION CABINETS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Key storage cabinets for fire access

1.2 SUBMITTALS & SUBSTITUTIONS

- A. Provide submittals under provisions of Section 01 33 00, "Submittal Procedures"
- A. Product data
 - 1. Submit product data for flooring materials and accessories.
 - 2. Submit manufacturer's installation instructions.
- B. Substitutions – Only as allowed by local fire marshal – see Item 3.1 within this Section.

1.3 OPERATION AND MAINTENANCE DATA

- B. Submit cleaning and maintenance data under provisions of Section 01 77 19 – "Closeout Requirements"

PART 2 - PRODUCTS

2.1 MANUFACTURER – KEYED STORAGE CABINET

- A. Knox Company, Website: <https://www.knoxbox.com/>
 - Address: 1601 W. Deer Valley Road. Phoenix, AZ 85027
 - Phone: (800) 552-5669
- B. Series: "Knox Box", Model 3200 Key Cabinet
 - Product Website Link
https://www.knoxbox.com/KNOX/media/KNOX/SpecSheet_KnoxBox3200_W_1.pdf?ext=.pdf
 - 1. Description – High security industrial/government key box with ¼" plate steel housing, ½" thick steel door with interior gasket and stainless-steel door hinge. Box and lock UL listed. Lock has 1/8" thick stainless-steel dust cover with tamper seal mounting capability.
 - a. Exterior Dimensions – 4" H. x 5" W x 3 ¾" D. Recessed mount flange – 7"H x 7" W.
 - b. Rough-in Dimensions – 6 ½" H. x 6 ½" W x 5" D.
 - c. Recessed – Requires recessed mounting kit (RMK) – See Detail 26/c6.5 for mounting requirements.
 - d. Lock: Single Lock – UL listed. Double-action rotating tumbler and hardened steel pins access by a biased cut key.
 - e. Finish and Color – Powder-coated/dark bronze

- f. Weight – 9 lbs.
- g. Capacity – 10 hooks

PART 3 - EXECUTION

3.1 ORDERING

A. Knox Boxes are required to be coordinated and ordered through the local fire marshal. Contractor shall coordinate required ordering procedures

B. Local Fire Marshal Contact Information:

City of Alameda Fire Department

1300 Park Street, Alameda, CA 94501

Contact: Richard Waggener, Division Chief/Fire Marshal

E-mail - rwaggene@alamedaca.gov

Phone –

510-337-2122-Direct

510-337-2120-Office

3.2 \INSPECTION

1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. In the event of discrepancy, immediately notify the Architect.
3. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions at the locations shown in the drawings
- B. Seal all edges.

END OF SECTION

SECTION 10 44 13
FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire-protection cabinets for portable fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.
- C. Samples: For each type of exposed finish required.

1.3 CLOSEOUT SUBMITTALS

- A. Refer to spec section 01 77 00.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Babcock-Davis; Select Fire Extinguisher Cabinet (BFC-70) or comparable product by one of the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Larsens Manufacturing Company.
- B. Cabinet Construction: Nonrated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch-thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Cold-rolled steel sheet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.
- F. Cabinet Trim Material: Steel sheet.
- G. Door Material: Steel sheet.
- H. Door Style: Vertical duo panel with frame.
- I. Door Glazing: Tempered float glass (clear).
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- K. Accessories:
 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 2. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
 3. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Engraved Etched.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- L. Materials:
 1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
 - b. Color: As selected by Architect from manufacturer's full range.
 2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

3. Transparent Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), 6 mm thick, with Finish 2 (patterned, textured).

2.3 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION

SECTION 10 51 13
METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Welded lockers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For metal lockers.
1. Include plans, elevations, sections, and attachment details.
 2. Include locker identification system and numbering sequence.
- C. Samples: For each color specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
1. Warranty Period for Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. ROOM 203 THREE TIER 72" TALL 15w x 18"d
- B. Welded Corridor Lockers
1. Basis-of-Design Product: Subject to compliance with requirements, provide DeBourgh Mfg. Co.; All American Corridor or comparable product by one of the following:
 - a. DeBourgh Mfg. Co.
 - b. Lyon Workspace Products, LLC; Integrated Frame All-Welded (IFAW)
 - c. Penco Products, Inc; All-Welded Defiant

2. Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
 - a. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 - b. Door Style: Vented panel as follows:
 - 1) Louvered Vents: No fewer than three louver openings at top and bottom for double-tier lockers.
3. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
 - a. Tops, Bottoms, and Sides: 0.060-inch nominal thickness.
 - b. Backs: 0.048-inch nominal thickness.
 - c. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.
4. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
5. Hinges:
 - a. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
6. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
 - a. Single-Point Latching: Nonmoving latch hook with steel padlock loop that projects through recessed cup and is finished to match metal locker body.
 - 1) Latch Hook: Equip each door with one latch hook.
7. Door Handle and Latch for Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.
8. Locks: Combination padlocks.
9. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
10. Coat Rods: Manufacturer's standard.
11. Continuous Zee Base: Fabricated from, manufacturer's standard thickness, but not less than 0.060-inch nominal-thickness steel sheet.
 - a. Height: 4 inches.
12. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
13. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
14. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of non-recessed metal lockers; finished to match lockers.
15. Materials:

- a. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - b. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with A60 zinc-iron, alloy (galvannealed) coating designation.
16. Finish: Baked enamel or powder coat.
- a. Color: As selected by Architect from manufacturer's full range.

C. Locks

1. Combination Padlock: Key-controlled, three-number dialing combination locks; capable of five combination changes.

2.2 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.
- C. Equipment: Provide each locker with an identification plate and the following equipment:
 1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
 2. Coat Rods: For each compartment of each locker.
- D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.
- E. Accessible Lockers: Fabricate as follows:
 1. Locate bottom shelf no lower than 15 inches above the floor.
 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
- F. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.
- G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
- H. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.
- I. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- J. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install lockers level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 2. Anchor single rows of metal lockers to walls near top and bottom of lockers of lockers and to floor.
- B. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.
- C. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
1. Attach recess trim to recessed metal lockers with concealed clips.
 2. Attach filler panels with concealed fasteners.

END OF SECTION

SECTION 11 11 43

RELOCATION OF EXISTING INDUSTRIAL SHOP EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. 02 41 16 STRUCTURE DEMOLITION

1.2 SUMMARY

A. Section includes Owner Furnished Contractor Installed (OFCI) equipment.

1. Owner Furnished Equipment is scheduled on Industrial Series Drawings "Industrial Equipment Schedule."
2. Unless indicated otherwise, Owner Furnished equipment is existing and shall be removed from existing locations and reinstalled at new locations indicated on Drawings.
 - a. Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
 - b. Disassemble and reassemble items as required. Use gentle methods and appropriate equipment to prevent damage to the item and surfaces.

A. Related Requirements

1. Division 01 "Buy America Requirements" for special product requirements.
2. Section 03 30 00 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.

1.3 COORDINATION

- A. Coordinate size and location of recesses and inserts in concrete and masonry required for installation of relocated equipment.
- B. Coordinate sizes and locations of concrete bases supporting relocated equipment.
- C. Coordinate sizes and locations of blocking and backing required for installation of relocated equipment attached to wall and ceiling assemblies.
- D. Coordinate locations and installation of relocated equipment that may interfere with ceiling systems including lighting, HVAC, speakers, sprinklers, access panels, electrical switches or

outlets, and floor drains.

- E. Coordinate locations and requirements of utility service connections.

1.4 PREINSTALLATION MEETINGS

- A. Equipment Relocation Scheduling Conference: Conduct conference at Project site prior to completion of final Construction Schedule and prior to submitting preliminary "Equipment Relocation Schedule."
 - 1. Conference participants shall include Owner, existing equipment Remover / Reinstaller(s), Architect, and Architect's Industrial Equipment Consultant.
 - 2. Incorporate conference decisions into "Equipment Relocation Schedule" after reviewing the following:
 - a. Preliminary Construction Schedule.
 - b. Drawing's "Industrial Equipment Schedule" and related Drawings.
 - c. As-built equipment related drawings and other documentation provided by Owner.
- B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of equipment to be relocated.
 - 2. Review and finalize delivery of "Owner's Existing Equipment Certifications" to Contractor.
 - 3. Review and finalize "Equipment Relocation Schedule" and verify availability of materials, equipment, facilities, and qualified personnel needed to make progress and avoid delays.
 - 4. Confirm temporary storage location(s) for relocated equipment between removal and reinstallation operations.
 - 5. Review and finalize inspection and testing procedures for installed equipment.

1.5 ACTION SUBMITTALS

- A. Equipment Relocation Schedule: Submit preliminary Schedule after conducting Equipment Relocation Scheduling Conference and no later than 60 business days prior to initial equipment relocation operations. Allow 10 business day for Architect's and Owner's initial review and 5 business days for final review. Include the following:
 - 1. Identify equipment using same "tag" identifier used on Industrial Equipment Drawings.
 - 2. Detailed sequence of OFCI equipment removal and reinstallation work, with starting and ending dates for each activity. Ensure Owner's on site operations are uninterrupted.
 - 3. Interruption of utility services resulting for equipment relocation operations. Indicate how long utility service will be interrupted.
 - 4. Coordination for disconnecting equipment, including shutoff, capping, and continuation or abandonment of utility services.
 - 5. Coordination for reconnecting equipment.
 - 6. Use of elevators, stairs, entrances, openings, walkways, roadways, and other pathways required for transport of relocated equipment.
 - 7. Temporary storage of equipment including durations.

- B. Shop Drawings: Where reinstallation is by existing equipment manufacturer's representative, furnish shop drawings for installation. Include plans, elevations, sections, rough-in dimensions, fabrication details, utility service requirements, and attachments to other work.

1.6 INFORMATION SUBMITTALS

- A. Qualification Data: For Remover/Reinstaller of the following:
 - 1. Relocated equipment permanently fixed in place.
 - 2. Relocated equipment permanently connected to electrical power, plumbing, compressed air, and other utility services.
 - 3. Relocated equipment requiring disassembly and reassembly.
 - 4. Relocated equipment requiring continuation of existing warranties.
- B. Field quality-control reports.
- C. Pre-removal Photographs or Videos: Show existing conditions of existing equipment, including finish surfaces, that might be misconstrued as damage caused by removal operations. Comply with Division 01 "Photographic Documentation." Submit before Work commences.
- D. Warranties: Documentation indicating that existing warranties are still in effect after completion of equipment reinstallation.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each relocated equipment unit to include in operation and maintenance manuals. Include the following:
 - 1. Equipment number used in Specifications and on Drawings.
 - 2. Owner's existing equipment certifications provided prior to equipment relocation.
 - 3. Pre-removal photographs or videos submitted prior to equipment relocation.
 - 4. Contact information of remover/reinstaller firm or individual. Include street address, telephone number(s), and email address for each.
 - 5. Field quality control test and inspection reports, if any.
 - 6. For equipment still under warranty, include documentation verifying that existing equipment has been inspected and warranty remains in effect.

1.8 QUALITY ASSURANCE

- A. Remover/Reinstaller Qualifications: A firm or individual experienced in removing and reinstalling, and disassembling and reassembling as required, equipment units similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- B. Owner's Existing Equipment Certifications: Owner will provide written documentation certifying operational and safety conditions of OFCI equipment as determined by testing, observation, or other means. Obtain such documentation, through Architect, from Owner prior to equipment removal operations and retain for inclusion Operations and Maintenance Manual.

Documentation may include the following:

1. Manufacturer name and model number, and accessory information.
2. Contact information for factory-authorized service representative.
3. List of supplier for repair parts.
4. Original equipment installer.
5. Condition of operation or control systems.
6. Condition of accessories such as filters and lubricants.
7. Equipment performances ratings.
8. Degree of wear, operational quality, and parts damage.
9. Visual quality of metal and other material finishes, including extent of deterioration and wear.
10. Unsafe conditions.
11. Need for excessive maintenance.
12. Any abnormal noises and vibrations.
13. Any rough and substandard operation.
14. Any loose, damaged, and missing parts.
15. Status of existing warranty.

1.9 TRANSPORT, STORAGE, AND HANDLING

- A. Provide protective and supportive packaging and transport equipment suitable for handling, moving, and storing relocated equipment.
- B. Packaging shall be suitable for protection during transport and storage in humid and dusty conditions.
- C. Outside of packaging shall be indelibly labeled with relocated equipment description and tag number indicated on Drawing's "Industrial Equipment Schedule," and with description of contents. Packaging within packaging shall be similarly labeled.
- D. Each equipment item shall be packaged complete for moving.
- E. Between detachment and reinstallation operations, store relocated equipment off the ground, under cover, and in a dry location.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not reinstall equipment until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for building occupants during the remainder of the construction period.

1.11 WARRANTY

- A. Existing Warranties: Detach, disassemble, move, store, reassemble, and reinstall relocated equipment by methods and with materials and using approved firms or individuals so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties for OFCI

relocation equipment are indicated on the Drawing's "Industrial Equipment Schedule."

- B. Notify warrantor on completion of relocation operations, and obtain documentation verifying that existing equipment has been inspected and warranty remains in effect. Submit documentation at Project closeout; include in operations and maintenance manual.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Comply with Federal, State, and local law, regulations, and safety standards for removing and reinstalling existing equipment.

2.2 RELOCATED EQUIPMENT (OFCI)

- A. As indicated on Industrial Equipment Drawings "Industrial Equipment Schedule."

2.3 ACCESSORIES

- A. For existing equipment fastened or anchored to sleeves, inserts, anchoring, or other devices cast into existing concrete, provide new sleeves, inserts, anchoring, or other devices matching existing.
- B. Fasteners and Anchors: Furnish required fasteners and anchorage devices for installing relocated equipment, and furnish other components of work where installation of devices is specified in another Section.
 - 1. Concrete Floor Anchors: Galvanized-steel, post-installed expansion anchors, except provide stainless steel anchors in locations receiving water spray. Provide number per unit recommended by manufacturer unless additional anchors are required for conditions indicated.
 - 2. Wall Anchors: Corrosion resistant, except provide stainless steel in locations receiving water spray; suitable for securing equipment to adjacent wall. Provide number per unit recommended by manufacturer unless additional anchors are required for conditions indicated.
- C. Installation accessories as required for complete reinstallation of OFCI equipment scheduled.

PART 3 – EXECUTION

3.1 EXAMINATION PRIOR TO RELOCATION

- A. Verify that existing equipment utilities have been disconnected and capped before starting detachment and disassembly operations.
- B. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

- C. Inventory and record the condition of equipment to be removed and reinstalled. Provide photographs or video of conditions that might be misconstrued as damage caused by relocation operations.

3.2 RELOCATION

- A. Detach equipment items from existing construction, in a manner to prevent damage, prepare for reuse.
- B. Disassemble equipment items as required. Use gentle methods and appropriate equipment to prevent damage to the item and surfaces.
- C. Protect items from damage during transport and storage in compliance with Part 1 Article "Transport, Storage, And Handling."
- D. Temporarily store items in a secure area until commencement of reinstallation operations.

3.3 EXAMINATION PRIOR TO REINSTALLATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine floors for suitable conditions where relocated equipment will be installed.
- C. Examine walls and ceilings to which relocated equipment will be attached for properly located blocking, grounds, or other solid backing for attachment of support fasteners.
- D. Examine utility services to which relocated equipment will be connected for proper location and required type.
- E. Examine relocated equipment prior to reinstallation. Compare condition of equipment with conditions stated on "Owner's Existing Equipment Certifications" and with pre-removal photographs and videos. If equipment conditions have deteriorated or if damage has occurred notify Architect in writing prior to commencing reinstallation operations. Written notification shall describe worsened conditions.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 PREPARATION

- A. Vacuum and clean finished floor over which relocated equipment, of type covering floor, is to be installed.

3.5 REINSTALLATION

- A. Reinstall relocated equipment according to available manufacturer's written instructions and, if applicable, available shop drawings. Unless indicated otherwise install equipment level, plumb, square, rigid, and true. Install free of dents or distortion. Make connections to form a

rigid structure, free of buckling and warping.

1. Reassemble equipment items as required. Use gentle methods and appropriate equipment to prevent damage to the item and surfaces.
 2. Install exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
 3. Install braces, straps, plates, brackets, and other reinforcements as needed to support equipment loading and as required for stability.
 4. Anchor equipment indicated to be permanently fixed in place using fasteners of type per DSA approved drawings.
 5. Connect equipment to utilities indicated.
 6. Seismic Restraints: Reinstall seismic-restraint devices using new fasteners and anchors per DSA approved drawings.
- B. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

3.6 ADJUSTING

- A. Adjust relocated equipment so that connectors and other components engage accurately and securely.
- B. Adjust and lubricate operable components to operate smoothly and easily, without binding or warping. Check and readjust operating hardware.

3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
1. Perform visual and utilities (electrical, plumbing, and compressed air as applicable) inspection and testing for each relocated equipment unit according to manufacturers' written recommendations. Certify compliance with each manufacturer's equipment-performance parameters.
 2. Leak Test for Plumbing and Compressed Air: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 3. Operational Test: After installation, start units to confirm proper operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
 5. See Section 01 41 00 "Quality Requirements" for retesting and reinspecting requirements and Section 01 78 39 Record Documents.
- B. An equipment unit will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.8 CLEANING AND PROTECTING

- A. Return relocated equipment to condition existing before relocation operations began. Touch-up marred surfaces caused by relocation operations. Repair equipment components damaged by relocation operations; replace equipment components that have been damaged beyond successful repair.
- B. Clean finished surfaces and make ready for use. Remove residual oil, grease, solvents, and other contaminants using methods and products that will not damage equipment surfaces.
- C. Protect installed equipment from damage during remainder of the construction period.

END OF SECTION

SECTION 11 14 60

FLUID DISPENSING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies furnishing, installing, and testing fluid dispensing system equipment at locations indicated on the Contract Drawings. Provide all piping, wiring conduit, ductwork and switching required connecting the dispensing system equipment to the compressed air system and electrical system.
- B. Substitutions: To be provided in accordance with requirements listed in documents.
- C. Equipment items covered in the section are listed below with their paragraph numbers corresponding equipment numbers:
 - 1. 4708, REEL ASSEMBLY, AIR / DROP CORD
 - 2. 4709 WASTE OIL AND ANTIFREEZE/COOLANT EVACUATION PUMP STATION
 - 3. 4715, EVAC WASTE OIL/WASTE COOLAND
- D. Related Requirements:
 - 1. Concrete - Division 3
 - 2. Equipment General Requirements
 - 3. Plumbing - Division 22
 - 4. Mechanical - Division 23
 - 5. Electrical - Division 26

1.2 DEFINITIONS

- A. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, it is intended to establish required performance of the product. See Section 016000 - Product Requirements for more information.

1.3 QUALITY ASSURANCE

- A. Model numbers indicated are to establish a minimum standard of quality. Any substitutions not meeting the minimum requirements shall be approved by the Lee Tran Representative.
- B. Substitutions: To be provided in accordance with requirements listed in Section 016000/1.06.

1.4 SUBMITTALS

- A. Shop Drawings to be submitted shall include all piping and electrical conduit runs required to supply all of the reel locations from the applicable pumps. These drawings shall include the overhead structure showing where the pipes, reels, and conduit are supported. The Drawings shall also show where the crane, lights, natural light structure, ductwork, and vehicle exhaust

- systems are to avoid interference with them while determining where the feeds for the reels are to be placed.
- B. Submit catalog cuts and all manufacturers data covering all equipment covered in this section. If submitting catalog cuts, the contractor is responsible to assure that the models specified or submitted are highlighted or underlined. No generic information shall be accepted.
 - C. Product Submission and Shop Drawings: As specified in Section 110000.
 - 1. Work includes furnishing and installation of heat actuated shut-off valves, shut-off valves, check valves, flexible hydraulic hose, distribution piping and fittings, fluid solenoid valves, pulse transmitters, fluid hose reel assemblies, control handles, meters, pump systems, mounting accessories, above ground tanks, tank leveling alarm system and all other work and material to provide an approved working installation as shown in the Contract Drawings and as specified.
 - D. Unless otherwise specified, any materials described, shown, reasonably implied, or obviously a part of the system and necessary to its complete finish and perfect operation shall be furnished and installed, without extra charge. The drawings and specifications are intended to supplement each other, and any item set forth in either shall be recognized as the same as if fully set forth in both.
 - E. The contractor shall be responsible for coordinating all of the materials and equipment to provide a complete fully operational fluid dispensing system. Information provided on the Contract Drawings and specifications are requirements to be used as guidelines to assist the Contractor.
 - F. Where design information is not specifically noted on the Contract Drawings, it shall be the responsibility of the Contractor to develop such design information as required by the manufacturer for a complete operational system.
 - G. The various component parts shall function together as a workable fluid dispensing system, complete with everything necessary for its operation and with all equipment properly adjusted and in working order.
 - H. Contractor shall provide complete maintenance and operation manuals for all of the fluid dispensing equipment under this section.

1.5 WARRANTY

- A. Following completion, the Contractor shall provide the Owner with a one (1) year warranty starting at project acceptance, covering all parts, materials, and labor. All warranty work shall be performed by a local manufacturer's representative at the Project Site location, who has capabilities of responding to all problems within 24 hours. Any shipping and delivery costs associated with the warranty of this equipment shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 FLUID DISPENSING EQUIPMENT

- A. Acceptable Manufacturers
 - 1. Products of the following manufacturer are specified herein as the standard of quality for the Fluid Dispensing equipment:

- a. Graco, Incorporated
88 11th Ave N.E.
Minneapolis, MN 55413
Telephone: (800) 533-9655
2. Products of equal quality and utility of the following manufacturers shall be accepted:
 - a. Lincoln St Louis Lubrication Equipment
4010 Goodfellow Blvd.
St. Louis, MO 63120
Telephone: (314) 679-4200
 - b. Aro Products
23 West Aylesbury Road
Timonium, MD 21094
Telephone: (410) 252-9300
 - c. Samson Corporation
One Samson Way
Swannanoa, NC 28778
Telephone: (800) 311-1047

2.2 COMPRESSED AIR REEL

- A. Equipment Item No. 4708 (partial)
- B. Provide a heavy duty, large capacity open compressed air hose reel with the following attributes:
 1. Metal supports on one end of the reel hub.
 2. Weld gusset arm supporting side of the roller guide, which can be rotated 270 degrees.
 3. Dispenser hose: 65 foot long: 3/8 inch inside diameter: 300 psi working pressure.
 4. Connecting inlet hose: 24 inches long: 1/2 inch inside diameter: 300 psi working pressure model (218549).
 5. Mounting accessories for overhead in reel banks and single reel wall mounting.
Contractor to provide supports for reel banks.
- C. Air reel shall be Model No. [**SD Series Reel Size 20 HPL56**] complete as manufactured by Graco, Inc. or approved equal with the above minimum requirements.

2.3 ELECTRIC LIGHT (EL) REELS

- A. Equipment Item No. 4708 (partial)
- B. Electric Reels shall have the following requirements:
 1. 40 ft. 16/3 SJTOW Retracting Cord
 2. 2 ft. 16/3 SJTOW Power Inlet Cord with NEMA 5-15 Plug
 3. 10 amp maximum power rating
 4. Voltage: 120V
 5. Hertz: 60HZ

- C. Electric reels shall be Model No. 2640-5001 as manufactured by SAF-T-LITE or approved equal with the above minimum requirements.

2.4 WASTE OIL AND ANTIFREEZE/COOLANT EVACUATION PUMP STATION

- A. Equipment item No. 4709
- B. Provide diaphragm pumps to be wall mount design to draw waste oil / automatic transmission fluid from oil and antifreeze receivers in the Maintenance Building with the following features:
 - 1. Power Factor: 1:1
 - 2. Maximum Air @ 100 psi: 28 scfm
 - 3. Maximum Air: 100 psi
 - 4. Free Flow Rate: 16 gpm
 - 6. Air Inlet: 1/2 inch npt
 - 7. Fluid Inlet Port Size: 1 inch
 - 8. Fluid Outlet Port Size: 1 inch
 - 9. Provide all the required components for oil receiver connections including suction hose kit and mounting accessories for wall mount installation.
 - 10. Provide air filter, regulator, 200 PSI rated gauge, water separator and lubricator for airline connection.
 - 11. Compressed air line to pump shall be equipped with a solenoid valve interconnected to the overfill alarm on the waste oil tanks. Compressed air to pumps to be shut off when tank reaches alarm level
- C. Pump directly connected to a drain line plumbed to an above ground waste oil / automatic transmission fluid tank and antifreeze/coolant tank.
- D. Pump to be supplied with air connection hose, airline filter, lubricator, regulator and 200 PSI rated gauge, quick disconnect air and fluid couplers, fluid evacuation hoses, and a shut-off valve for pump activation. Valve shall be located near the pump.
- E. Provide wall hangers for siphon hoses when not in use.
- F. Evacuation pumps shall be Model 515 Double Diaphragm Transfer Pump as manufactured by Graco Lubrication Equipment, or approved equal with the above minimum requirements.

2.5 REMOTE EVACUATION PUMP STATION

- A. Equipment item No. 4715

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install equipment in strict accordance with approved Shop Drawings and manufacturers installation instructions all locations indicated in drawings.
- B. Coordinate installation of the fluid reels at the bays and the pumps supplying service located along the exterior wall with the process piping co-ordination drawings and specifications. Provide all connections for proper operation of the fluid distribution system.

- C. Provide isolation valves every two bays to every fluid and air line in the facility servicing the reels to provide isolate areas for servicing.
- D. Provide mounting channels and brackets and structural supports (where required) as recommended by manufacturer for reel bank support. Mounting heights as indicated in the drawings. Provide required bracket for such installation.
 - 1. Contractor to use Graco mounting channels as required for each type of reel bank. Provide mounting channels also as required to work in conjunction with structural supports.
- E. Provide all air line connections to fluid pumps with required air filter, regulator, valve, water separator and lubricator.
- F. Coordinate the installation of the overfill alarm on the waste oil/ATF and coolant tanks and the interconnection to the solenoid valve on the compressed air lines supplying the waste oil and coolant pumps. Compressed air to the pumps shall be shut off when the tank is full and alarm is activated.

3.2 FIELD QUALITY CONTROL

- A. Provide the services of qualified manufacturer's representatives to perform the following as stated in section 110000 of these specifications:
 - 1. Inspect preparatory work performed by other trades.
 - 2. Inspect installation.
 - 3. Coordinate, prior to installation, the mounting requirements of the fluid pumps to the tanks to assure that proper hardware has been provided.
 - 4. Provide shut-off valves for each pump at a convenient visible location for emergency shut-off of fluid lines and at each reel for individual service, as required.
 - 5. Prior to substantial completion of the facility, inspect testing, by the Contractor in the presence of the MST Representative, to ensure proper operation of the equipment.
 - 6. Instruct personnel in the proper safe operation and maintenance of the equipment.
 - 7. Perform all scheduled and unscheduled maintenance during warranty period; provide all labor and materials.
- B. Testing/Inspection Requirements:
 - 1. Prior to accepting the equipment, every reel shall be inspected for fluid delivery, nozzle function and reel mechanism. All fluid lines shall be primed and bled prior to inspection of the equipment.
 - 2. The Contractor shall be responsible for reimbursing the Owner for all of the fluid utilized for testing the fluid distribution system.

END OF SECTION

SECTION 11 24 19
VACUUM EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Overhead Exhaust Extraction System
- B. Exhaust Blowers

1.2 RELATED SECTIONS

- A. Division 15 Sections for exhaust ductwork; service roughing-ins; pipes, and fittings; and other materials required to complete equipment installation.
- B. Section 26 01 10 – General Requirements Electrical

1.3 REFERENCES

- A. OSHA - 29 CFR Part 1910

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Systems shall meet the Air Contaminant requirements of 54 Federal Register, 232(1989), 29 CFR Part 1910
- B. Each exhaust connection shall be capable of 300 CFM minimum.

- C. UL Certification: Provide electric equipment and components that are evaluated by UL for fire, and electric shock according to applicable safety standards and that are UL certified for compliance and labeled for intended use.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate required overall dimensions (width, height). Supporting construction requirements and equipment structural attachment. Operating range and required clearances.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Closeout Submittals: Provide manufacturer's operating and maintenance instructions that include recommendations for periodic checking and adjustment and periodic cleaning and maintenance of all components.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing manufacturing equipment specified in this Section with minimum 5 years' experience.
- B. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years' experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.8 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Harvey Industries, Inc.; 935 Moe Dr., Akron, OH 44310. Toll Free: 866-633-0122. Phone: 330-633-0122. Fax: 330-633-0320. Web: www.harveyexhaust.com. Email: kmorris@harveyexhaust.com
- B. Substitutions: Not permitted.

2.2 OVERHEAD VEHICLE EXHAUST EXTRACTION SYSTEMS

- A. Telescoping System: Harvey Industries Telescopically Designed Overhead Exhaust Drop with non-crush tubing and adapter.
 - 1. Model #TS-30 Telescopic Design: System consists of three lengths of light weight flexible tubing which slide one into another and gives the appearance of one 6 foot length of tubing attached to the overhead duct. Provide with tubing and tailpipe adapter of non-crush neoprene rubber.
 - 2. Model #TS-40-DY Telescopic Design: System for medium and heavy duty diesel vehicles where standard 4 inch tubing is inadequate. System consists of three lengths of light weight flexible tubing, which slide one into another, and gives the appearance of one 6 foot length of tubing attached to the overhead duct. Provide with Heavy Duty High Temp Tubing and tailpipe adapter of non-crush neoprene rubber.

2.3 EXHAUST BLOWERS

- A. Housings, wheels and frames are continuously welded providing heavy duty construction and assuring solid, rattle free units. Wheels are supported by heavy cast iron hubs and are static and dynamically balanced. Stock units are available from 1/2 HP thru to 7-1/2 HP-405CFM-8200CFM units. Motors are industrial grade, UL listed, and available in 208/230/460/3/60 or 115/230/1/60. All are industrial rated high efficiency motors. All blower units shall be rated

- in accordance with AMCA Standards and bear the AMCA Seal.
- B. Belt Drive Blowers: Belt drive units are equipped with variable speed sheaves. The BD-9 and larger belt drive units utilize backward inclined wheels for maximum performance and non-overloading characteristics.
1. Model No. BD-15:
 - a. HP 5
 - b. Wheel Dia. 18
 - c. CFM @ S.P 1-1/2 inch hose 6836
 - d. CFM @ S.P 2-1/2 inch hose 6457
 - e. CFM @ S.P 3 inch hose 6077
- C. Accessories: Provide blower with the following accessories.
1. All-Weather Cover.
 2. Back Draft Damper.
 3. Vibration Pads.
 4. Belt Guard.
 5. Type "B" Spark Resistant Construction.
 6. Inlet and Outlet Flexible Connections.
 7. Blower Platforms.

2.4 COMPONENTS AND ACCESSORIES

- A. Provide the exhaust system with the following components and accessories:
- B. AR Series Rubber Stack/Tailpipe Adapter:
1. Model: H-476 - Universal rubber adapter for tailpipes up to 3 inch diameter with chain and hook in place of snaps.
- C. "Y" harness for dual exhaust
1. Model: H-30-3-47 – 2-4' x3" Hose, 1-2'x3" hose, 1-H-483 "Y" fitting, and 2-HF-477 adapters
 2. Model: H-40-4-57 – 2-4' x4" Hose, 1-2'x4" hose, 1-H-484 "Y" fitting, and 2-HF-577 adapters
- D. Cast Aluminum "Y" Fittings: Molded Rubber for use in "Y" harnesses.
1. Model: H-481 - 3 inch hose.
- E. Energy Saving Dampers: Mounted in the hose drop of an overhead system to cut off the majority of air flow when not in use.
1. Model: ES-130 for 3 inch hose.
- F. Tailpipe Adapters: To avoid continual replacement of exhaust hose, tailpipe adapters should be used. Harvey tailpipe adapters are available for all sizes of hose and tubing, and are manufactured in rubber and stainless steel.

1. Model: HF-477- Rubber oval shaped (3 inch by 6-1/2 inch) for twin tailpipes. Fits 3 inch or 4 inch hose.
2. Model: HF-577- Rubber oval shaped (3 inch by 8-1/2 inch) for twin tailpipes. Fits 3 inch or 4 inch hose.

2.5 FUME ARM

A. Adjustable Exhaust Fume Arm

1. Standard fume arms are available in 4",5",6" diameter and 6',10, and 13' lengths.
 - a. The fume arm shall be equipped with a swivel at the top of the assembly to allow the arm to rotate 360 degrees on the vertical axis.
 - b. All joints in the assembly shall be connected with flexible hose connections enabling full motion and flexibility.
 - c. The assembly will be fitted with an integrated damper allowing for airflow control.
 - d. The tension in each flexible joint shall be controlled by adjustable nylon compression friction discs.
 - e. Provide steel wall or column mounting bracket when necessary

B. SWIVEL BOOM EXTENSION FOR ADJUSTABLE FUME ARM

1. Standard boom extensions are available in 6', 8' and 13'
 - a. The mounting base assembly shall consist of a steel mounting base suitable for wall or column mount and swivel assembly.
 - b. The swivel assembly shall be constructed of cast aluminum rings fitted with roller bearings for ease of movement. Swivel assembly shall allow for unobstructed 180-degree movement.
 - c. The extension portion of the boom shall be a square steel extension tube that will also function as a flow path for the air pulled through the system.
 - d. The end of the boom assembly will be fitted with a flange enabling the fume arm to be bolted directly to the assembly.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Test for proper operation and adjust until proper operation is achieved.
- C. Before acceptance, conduct a demonstration in the presence of the Owner's representative that all equipment operates properly in every aspect. Conduct a detailed user/operator training session at time and place agreed upon by Owner's representative.

3.4 ADJUSTING AND BALANCING

- A. Adjust and balance system for proper ventilation.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 24 00

ROLLER SHADE

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Roller shade systems.

1.2. SUBMITTALS

- A. Submit manufacturers data, samples, and certificates of flammability under the provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
- A. Shop Drawings:
 - 1. Provide shop drawings of all installations, including mounting, relationship to adjacent materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.
 - 2. Provide operational clearances, wiring diagrams and relationship to adjacent work.
 - 1. Where directed by Architect, prepare shop drawings on Autocad format using base sheets provided electronically by the Architect.
- B. Window Treatment Schedule: Provide all treatments, use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- A. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
 - 1. Provide complete color range of specified product series for Architects color selection. Submit fabric swatches in 4 x 4 inch minimum dimension.
 - 2. Following selection, provide 3 samples of each selection in size directed by Architect.

- B. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements, shade cloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.
- C. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- D. Submit California State Fire Marshal certificate of Fire Resistance Listing.

1.2. QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
- C. Fire-Test-Response Characteristics: Passes NFPA 701-2015 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, and ATCC9645.
- F. Mock-Up: Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.
 - 1. Locate mock-up in window designated by Architect.
 - 2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.3. REGULATORY REQUIREMENTS

- A. Submit California State Fire Marshal Certificate of Flame Resistance Listing.

1.4. DELIVERY STORAGE AND HANDLING

- A. Deliver to and store products on site in conformance with Section 01 60 00.
- B. Do not deliver window treatments until interior finish work is complete and painted surfaces are fully cured. Do not deliver drapery fabrics until rods are in place and ready for draperies to be hung.

1.5. WARRANTY

- A. Roller Shade Hardware, Chain and Shadecloth: Manufacturer's standard non-depreciating twenty-five year limited warranty.
- A. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 – PRODUCTS

1.2. MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 13
- B. Roller shade system
- C. Manufacturer: Mecho Shade Systems,, <http://www.mechoshade.com>.
- D. Type: Manual single roll down shade.
 - 1. Type 1: Manual operating, chain drive, sunscreen roller shades in all exterior windows of rooms and spaces shown on the Drawings.
- E. Series: Mecho /5 Series
 - 1. Provide brackets and drive extension as required for application shown on drawings.
- F. Fabric:
 - 1. Type 1: ThermoVeil 1000 Series
 - a. Dense Vertical Weave: 75%PVC (coating), 25% polyester (yarn)
 - b. Openness Factor: 2-3%, up to 7% visible light transmittance
 - c. Color as selected from manufacturer's standard colors.
- B. Mounting: As shown on drawings.

1.2. OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

1.3. SURFACE CONDITIONS

A. Inspection

1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.4. SHADE INSTALLATION

- A. Install in accordance with the manufacturers instructions.
- B. Securely attach brackets to studs or backing and install level to full length of window frame or pocket.

1.5. ADJUSTING AND CLEANING

- A. Clean all treatments of loose thread, lint, and dust.

END OF SECTION

SECTION 12 36 00

STAINLESS STEEL COUNTERTOP

1. PART 1- GENERAL

1.1. SECTION INCLUDES

1.1.1. Custom fabricated.

1.1.2. Installation, including connection to utilities.

1.2. REFERENCES

1.2.1. Underwriters Laboratories (UL).

1.2.2. National Electric Code (NEC), current edition.

1.2.3. ASTM E 84, current edition.

1.3. QUALITY ASSURANCE

1.3.1. Manufacturer shall have produced products similar in scale and quality to those specified within past 12 months.

1.3.2. Freezer/Cooler manufacturer shall have produced units similar to that specified for a period of at least five (5) years prior to contract award.

1.4. REGULATORY REQUIREMENTS

1.4.1. All components shall be NSF Approved and labeled.

1.4.2. Electrical Wiring and Components: Conform to Underwriters' Laboratories Standards.

1.5. SUBMITTALS

1.5.1. Submit shop drawings and product data under provisions of Section 01 33 00.

1.5.2. Provide shop drawings of fabrication showing hardware and fittings, with plan, front elevation, cross-section showing anchorage details.

1.6. MAINTENANCE DATA

1.6.1. Submit operation and maintenance data under provisions of Section 01 78 23 and as specified in this section.

1.7. DELIVERY, STORAGE, AND HANDLING

1.7.1. Deliver and store products to site under provisions of Section 01 66 00.

1.8. WARRANTY

1.8.1. Provide manufacturer's warranty under provisions of Section 01 78 36.

2. PART 2 - PRODUCTS

2.1. STAINLESS STEEL

2.1.1. Materials:

2.1.1.1. Stainless Steel: Type 304, 14 gage, No. 4 finish unless noted otherwise.

2.1.1.2. Galvanized Steel: Per ASTM A 653, G90 finish, extra smooth finish.

2.2. OTHER PRODUCTS - GENERAL

2.2.1. Provide rough - in hardware, supports and connections, attachment devices, closure trim, and accessories as necessary for a complete and functioning food service installation.

2.3. STAINLESS STEEL FABRICATIONS

2.3.1. Stainless Steel Fastenings and Fittings: Exposed bolt heads will not be acceptable. Provide, when unavoidable, screws with countersunk flat heads at visible or accessible surfaces. Use concealed fastenings where possible.

2.3.1.1. Rivets of any kind are not acceptable.

2.3.1.2. Butt joints made by riveting straps under seams and filling with solder are not acceptable.

2.3.2. Form edges smooth. Fabricate sheet material for work surfaces.

2.3.2.1. All seams and joints shall be welded, one piece construction. All seams shall be ground smooth and finished to blend with adjacent surface.

2.3.2.2. Provide square edge, 2 inch drop, unless noted otherwise.

2.3.3. Provide cutting and patching of items of this Section required for the installation of other services.

2.3.4. Grind welds of stainless steel smooth and flush; polish to match adjacent surfaces.

2.3.5. Cut and drill components for service outlets and fixtures.

2.3.6. Shop assemble work where possible.

2.3.7. Coat underside of stainless steel fabrications with specified sound-deadening material, minimum 1/16 inch thick. Completely cover all fasteners and reinforcements. Terminate all mastic coating out of sight; exposed coating is not acceptable.

2.3.8. Align finish of wainscot material to run vertical.

3. PART 3 - EXECUTION

3.1. INSPECTION AND VERIFICATION

3.1.1. Verify outlets, service connections, and supports are correct and in scheduled location.

3.1.2. Verify all connection points, types of fittings, and capacities are appropriate and as required for the proper installation and operation of Owners equipment scheduled for relocation.

3.2. INSTALLATION

3.2.1. Cut, fit and patch where necessary. Coordinate work with others.

3.3. ADJUSTING AND CLEANING

3.3.1. Clean and adjust to ensure proper working order and conditions.

3.3.2. Remove masking or protective covering from finished surfaces. Wash and clean .

END OF SECTION

SECTION 12 48 13

ENTRANCE FLOOR MATS AND FRAMES

PART 1 - - GENERAL

1.1. SECTION INCLUDES

- A. Recessed entrance mat and frame.

1.2. SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Provide shop drawings of fabricated equipment showing mat, with plan, front elevation, cross-section showing anchorage details.
- C. Accompanying the shop drawings, submit a representative sample of the proposed mat frame and insert.

1.3. DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of the General Conditions.
- B. Store products under provisions of the General Conditions.
- C. Flammability in accordance with ASTM E648, Class 1, Critical Radiant Flux, minimum 0.45 watts/m².
- D. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for accessible routes.
- E. Standard rolling load performance to be 1000 lb./wheel (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage).
- F. Single Source Responsibility: Obtain floor mats/grids and frames from one source of a single manufacturer.
- G. All rail components shall be structural aluminum alloy 6105-T5.
- H. Manufacturer shall be ISO 9001 & 14001 certified.

1.4. PROJECT CONDITIONS

- A. Recessed Conditions: IMPORTANT: Coordination with Division 03 00 00 Concrete specifications is required. For proper installation, the concrete recess must be flat and smooth throughout. If the recess is formed by a concrete contractor, the pour dimensions may require leveling grout to achieve the proper depth and a smooth finish. The final recess depth will match the specified product and must be field verified. For proper frame installation, the side walls of the concrete recess must also be straight and smooth. Inconsistencies with the recess and side walls must be remediated prior to product installation.

PART 2 - - PRODUCTS

1.1. FLOOR ENTRANCE MATS AND FRAMES

- A. Basis of Design: Characteristics of specific products manufactured by C/S Group www.csgroup.com are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.
- B. Product Characteristics
 - 1. Series: [Peditred Series G4](#).
 - 2. Frame: Aluminum frame, clear anodized finish, with serrated vinyl filler where required. No drains in walk-off grate walls.
 - 3. Tread Type: Carpet, Tandus or equal, color as selected by Architect.
 - 4. Tread Rails: Vinyl alloy, with interlocking hinge permitting rollback feature. Provide abrasive rail finish, with black rail color.

1.2. OTHER MATERIALS

- A. Provide Geo Tile by Tandus or equal beyond entrance grill.
- B. Provide all other materials, not specifically described but required for a complete and proper installation of the work of this Section.

PART 3 - EXECUTION

1.1. SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - a. Verify tile alignment as shown on shop drawings. Adjust final mat size as necessary to align with tile joint dimensions.
 - 3. In the event of discrepancy, immediately notify the Architect.
 - 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.2. INSTALLATION

- A. Use anchoring devices appropriate for materials encountered and the usage expected.
- B. Install items in accordance with manufacturers' instructions.

1.3. ADJUSTING AND CLEANING

- A. Remove masking or protective covering from finished surfaces. Polish hardware, and accessories.

END OF SECTION

SECTION 12 93 00
SITE FURNISHINGS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements set forth in the General Conditions shall be in addition to the standards provided herein.
- B. The requirements set forth in the Supplemental Conditions shall be in addition to the standards provided herein.

1.2 DESCRIPTION

- A. Unless otherwise noted, furnish all labor, materials and equipment for the complete installation of all site furniture, including play equipment and play surfacing, as shown on the Plans and as specified herein.

1.3 REFERENCES

- A. Nothing in the Plans or Specifications is to be construed to permit work not conforming to regulating codes and standards. The Contractor shall furnish without extra charge any material and labor, when required, by the compliance with these rules and regulations, even though the work was not mentioned in these particular Specifications or shown on the Plans.
- B. The product manufacturer shall supply complete Specifications for the installation of all site furnishings, including play equipment and play surfacing.

1.4 SUBMITTALS

- A. Submittals for specified items are required. Conform to District's General Conditions. The Contractor shall submit a materials summary sheet indicating which items will be installed as specified and which items are proposed for substitutions. The Contractor shall submit proof of order within ten (10) working days of the Notice to Proceed, indicating all specified materials have been ordered, noting "as specified" or "substitution proposed".
- B. On the date of the Notice to Proceed, the Contractor shall immediately place the order to purchase all site furnishings as specified on the Plans and as outlined herein. Proof of all orders shall be submitted to the Project Manager within ten (10) working days of the Notice to Proceed.

1.5 RECORD DRAWINGS

- A. The Contractor shall keep an accurate record of the as-built conditions of the miscellaneous site amenities. These records shall be updated daily and kept at the construction site. At any time, the Inspector may examine the conditions of the “as-builts” to ensure compliance of the above.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall be as shown on the Plans and as manufactured by the selected manufacturer or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Contractor to provide experienced workers or subcontractors to install all site furnishings. The workers or subcontractor must demonstrate that at least five (5) similar projects and two (2) furnishings similar to each type of those specified for this project have been installed in the last five (5) years.
- B. All site furnishings shall be installed per manufacturer’s instructions.
- C. Heights of benches shall be as follows, unless otherwise required by Federal Accessibility Guidelines; California Title 24 or other code requirements:

Description	Height Above Finish Grade
Bench Surface Height	16” Minimum, 18” Maximum

- D. Carefully install all furnishings and equipment without disturbance to adjacent finishes. Contractor shall be responsible for the damage and subsequent repairs of damaged finished product.

3.2 CLEANING

- A. Thoroughly clean all areas where work has occurred. Remove from the site excess material, debris and rubbish.
- B. Take all precautions to protect completed work. Immediately repair or replace all damaged areas due to tire ruts, erosion, compaction failure, etc. Keep all erosion control measures intact.

3.3 WARRANTY

- A. Contractor shall also provide a written warranty covering all materials, equipment and workmanship furnished by him to be free of all defects after installation is accepted, including all defective parts that may have been found.
- B. Submit written warranty on company letterhead addressed to the District when providing as-built drawings.
- C. Attach cut sheets of installed items to the warranty.

END OF SECTION 12 93 00

SECTION 14 42 16

VERTICAL WHEELCHAIR LIFTS

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. EL – Enclosed.

1.02 RELATED SECTIONS:

- A. Section 00 33 00 - Cast-in-Place Concrete: Concrete shaftway and anchor placement.
- B. Section 04 22 00 – Concrete Unit Masonry: Masonry shaftway and anchor placement.
- C. Section 06 10 00 - Rough Carpentry: Blocking in framed construction for lift attachment.
- D. Section 09 21 16 - Gypsum Board: Gypsum shaft walls.
- E. Division 16 – Electrical: Dedicated telephone service and wiring connections.
- F. Division 16 – Electrical: Lighting and wiring connections at top of shaft.
- G. Division 16 – Electrical: Electrical power service and wiring connections.

1.03 REFERENCES:

- A. American Society of Mechanical Engineers (ASME) A18.1 – Safety Standard for Platform Lifts and Stairway Chairlifts
- B. American Society of Mechanical Engineers (ASME) A17.1 – Safety Code for Elevators and Escalators
- C. American Society of Mechanical Engineers (ASME) A17.5 – Elevator and Escalator Safety Equipment
- D. American National Standards Institute (ANSI) A117.1 – Accessible and Usable Buildings and Facilities
- E. National Fire Protection Agency (NFPA) – NFPA 70 – National Electrical Code
- F. ANSI/BHMA A156.19-2002 American National Standard for Power Assist & Low-Energy Power Operated Doors.
- G. UL 325 – Standard for Door, Drapery, Gate, Louver and Window Operators and Systems.

1.04 SUBMITTALS:

- A. Submit under provisions of Section 01 30 00 – Administrative Requirements.
- B. Product Data:
 - 1. Submit manufacturer’s installation instructions including preparation and equipment handling requirements.
 - 2. Show maximum and average power requirements.

- C. Drawings shall include:
 - 1. Typical details of assembly, erection and anchorage.
 - 2. Wiring diagrams for power, control, and signal systems.
 - 3. Complete layout with location of equipment.
- D. Manufacturer's Certificates must certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE:

- A. Manufacturer: Company shall contain personnel with not less than ten (10) years of experience in the design and fabrication of vertical wheelchair lifts.
- B. Technical Services: Manufacturer and authorized dealer shall work with architects, engineers and contractors to adapt the vertical wheelchair lift to the design and structural requirements of the building, site, and code requirements.
- C. Unit must be assembled and tested in factory before shipment. Vertical Wheelchair Lift equipment shall meet or exceed the National and Local standards.
- D. All load ratings and safety factors shall meet or exceed those specified by all governing agencies with jurisdiction and shall be certified by a professional engineer.
- E. Installer Qualifications: Factory trained and licensed to install equipment of this scope, with evidence of experience with specified equipment. Installing company shall have qualified people available to ensure fulfillment of maintenance and callback service.

1.06 REGULATORY REQUIREMENTS

- A. Provide Vertical Wheelchair Lift complying with:
 - 1. American Society of Mechanical Engineers (ASME) A18.1 – Safety Standard for Platform Lifts and Stairway Chairlifts
 - 2. American Society of Mechanical Engineers (ASME) A17.1 – Safety Code for Elevators and Escalators
 - 3. American Society of Mechanical Engineers (ASME) A17.5 – Elevator and Escalator Safety Equipment

1.07 DELIVERY, STORAGE, AND HANDLING:

- A. Products to be stored in manufacturers unopened packaging until ready for installation.
- B. Components stored off the ground in a dry covered space, protected from weather conditions.

1.08 PROJECT CONDITIONS:

- A. Vertical Wheelchair Lift shall not be used for hoisting materials or personnel during construction.

1.09 WARRANTY:

- A. Unit shall have a FOUR (4) year limited parts warranty covering replacement of defective parts of the basic unit, including all electrical and drive system components, at no cost. Labor costs required to replace parts is not included. Preventative maintenance agreement required.

1.10 MAINTENANCE

- A. Maintenance of the vertical wheelchair lift unit shall consist of regular cleaning, inspection, and adjustment of the unit at intervals not longer than every six (6) months. Rule 10.2.1 of ASME A18.1 requires all Vertical Wheelchair Lifts to be inspected every six (6) months. Provide maintenance contract for the following years:
1. 4 years.

PART 2 PRODUCT

2.01 MANUFACTURER:

- A. Acceptable Manufacturer: Symmetry Elevating Solutions
Email: customerservice@symmetryelevator.com
Toll Free: 877-568-5804
Website: www.symmetryelevators.com
- B. U.S. OWNED AND OPERATED: Manufacturer must be a registered U.S. owned company with manufacturing operations located in the United States of America – America Owned, American Operated.
- C. Or approved equal per 01-25-13
- D. Request for substitutions will be considered in accordance with provisions of section 01600.

2.02 ENCLOSED VERTICAL WHEELCHAIR LIFT:

- A. General Description: The Enclosed vertical wheelchair lift travels up and down within its own, self-contained enclosure. The enclosure can either have an “open inches look with a 42 inches tall gate and enclosure extension above the upper landing, or be fully enclosed complete with full-height doors, roof and ventilation system for outdoor applications. In addition to the drive tower, lift platform, and enclosure, this unit also has landing doors and/or gates that are fully integrated into the walls themselves.
- B. Capacity:
1. 750 lbs.
- C. Lifting Height:
1. Model EL/ELP -144, 147 inches maximum lift height.
- D. Clear Platform Size:
1. 36 inches W x 48 inches D
- E. Platform Configuration:
1. PL-1 Room 119 Enter/Exit same side.
 2. PL-2 Room 212 Straight Through
- F. Enclosure Panels:
1. Solid 18 gauge galvanized steel fill panel
- G. Enclosure Height Above Upper Landing:
1. Enclosure shall extend 42 inches above the upper landing level.

H. Lower Door/Gate Construction:

I. Provide an 80 inch tall steel framed landing gate including a “D inches style pull handle and required interlock Gate Construction

1. Solid 18 gauge galvanized steel fill panel

b. Opening / Closing Mechanism

1. PL-1: Low Energy Automatic Commercial Grade Automatic Door Operator
2. PL-2: Low Energy Automatic Commercial Grade Automatic Door Operator

J. Upper Door/Gate Construction:

1. Provide a 42 inch tall steel framed landing gate including a “D inches style pull handle and required interlock.

c. Gate Construction

1. Solid 18 gauge galvanized steel fill panel

d. Opening / Closing Mechanism

1. PL-1: Low Energy Automatic Commercial Grade Automatic Door Operator
2. PL-2: Self-Closing Hinges

K. Drive System

1. Standard Acme Screw Drive:

a. Travel speed: 10 fpm.

b. Motor: 1 ½ HP, 115 volt, 1 phase.

c. Power Supply:

1. 230 VAC, 15 Amp, Single Phase.
2. Battery Powered Emergency Lowering:
3. Battery powered platform lowering device which automatically activates in the event of power failure.
4. Capable of running lift up and down for a minimum of 5 trips with rated load at full speed.
5. The drive mechanism shall be a stationary nut on a rotating 1 inches diameter Acme screw with a secondary safety nut.

L. Lift Components:

1. Symmetry Elevating Solutions PLC Controller with self diagnostics and digital display. A.W.A.R.E. System (Active Wiring, Accessories, Relay & Electronics Diagnosis) generates on-demand diagnostic codes identifying trouble codes.
2. Platform lifts shall have low energy power operated door and gates compliant with CBC 11b-404.3 except where allowed by CBC 11B-410.
3. Doors shall remain open for 20 seconds minimum per CBC 11B-410.6

4. The Drive Tower support shall be a combination 7 gauge C Channel, 7 gauge interface plates and 16 gauge exterior skin.
5. Platform shall be constructed of 12-gauge minimum hot rolled steel. If unit is not installed in a 3-inch pit, an auto-retracting ramp, or stationary ramp, shall be provided that extends to meet lower landing.
6. Platform side panels shall be 42 inches high, side panel framework shall be a minimum of 1 inch x 1 ½ inch steel. Solid infill panels shall be a minimum of 18 gauge steel.
7. Carriage platform supports shall be a minimum of ½ inch steel
8. Nonmetallic rollers shall be used for axial carriage guidance and wear pads shall be used for horizontal stability.
9. Loaded fasteners shall be grade eight or higher. Locking fasteners shall be used in all critical locations.

M. Platform Base & Frame Installation:

1. Pit Mount: (recess application) Level pit floor slab recessed a minimum 3 inches by others as outlined on site specific drawings. This application does not require ramp and allows for smooth transition from landing into lifting equipment.

N. Platform Controls:

1. Platform lift shall not be attendant-operated and shall provide unassisted entry and exit from lift per CBC 11B-410.1.
2. Constant pressure up/down control switches shall be installed on the platform in ADA compliant locations. All switches meet IP66 requirements.
3. An illuminated emergency stop switch shall be provided on the platform controls with an audible alarm as a means of signaling for assistance in the event of an emergency.
4. Operation Type:
 - a. Keyless independent (attendant-free) operation.
5. Emergency Telephone:
 - a. Platform shall be equipped with a telephone meeting the following requirements:
 1. ADA compliant.
 2. Shall be operational in the event of power failure.
 3. Specified under Division 16 a telephone line shall be supplied to the lift.

O. Landing Controls:

1. Constant pressure, elevator-style, control switches provided at each landing in ADA compliant locations.
2. Operation Type:
 - a. Keyless independent (attendant-free) operation.
3. Landing Station Mounting:

a. Lower Landing Station:

1. In-Frame.

b. Upper Landing Station:

2. In-Frame.

P. Safety Features/Devices:

1. Grounded electrical system with upper and lower limit switches.
2. Upper final limit switch (Standard and Accelerated Acme Screw Drive).
3. A grab rail shall be provided on the platform.
4. A gate with a minimum height of 42 inches and a combination mechanical lock with an electric contact shall be provided at the upper landing, the gate must be closed for the lift to move away from landing.
5. At all landings, electromechanical interlocks shall be used to keep doors closed when lift is on another floor.
6. Electrical disconnect which will shut off power to the lift.
7. Pit stop switch mounted on Drive Tower.

Q. Finishes:

1. Finish shall be powder coating, oven baked.
2. Color:
 - a. Grey.

PART 3 EXECUTION

3.01 ACCEPTABLE INSTALLERS:

- A. Subcontractor Qualifications: A company that is listed as an authorized Symmetry Elevating Solutions dealer. See www.symmetryelevator.com for details.
- B. Electrical devices, service and final connections shall be by a qualified electrician.

3.02 EXAMINATION:

- A. Preliminary work must be properly prepared, including hoistway construction (if needed), landings and machine space, before installation.
- B. Verify hoistway shaft (if needed) and machine space are the correct size and within acceptance.
- C. Verify required landings and openings are the correct size and within acceptance.
- D. When required verify machine room is provided with lighting, light switch, outlets and meets the clear space requirements of ASME A18.1.
- E. Verify electrical power is available and of within acceptance.
- F. Notify Architect of any inadequate preparation when preliminary work is the responsibility of another installer.

3.03 PREPARATION:

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces and unit using the methods recommended by the manufacturer for achieving the optimum performance of vertical wheelchair lift.

3.04 INSTALLATION:

- A. Unit shall be installed and operated in accordance with the California Elevator Safety Orders (Title 8, Division 1, Chapter 4, Subchapter 6), NEC and ASME A18.1 Guidelines.
- B. A dedicated electrical supply provided to the disconnect shall be capable of supplying sufficient power.
- C. GC to coordinate “work by others” with lift contractor.
- D. The installation of the vertical wheelchair lift shall be made in accordance with approved plans and specifications and the manufacturer’s installation instructions.
- E. Startup and test unit in accordance with manufacturer’s instructions.
- F. Adjust for smooth operation.

3.05 FIELD QUALITY CONTROL:

- A. Perform tests in compliance with ASME A18.1 and as required by authorities having jurisdiction.
- B. Load the vertical lift to rated capacity and test for several cycles to insure proper operation. No mechanical failures shall occur and no wear that would affect the reliability of the unit shall be detected.
- C. Schedule necessary tests with Architect, Owner, Contractor, and any authorities having jurisdiction.

3.06 PROTECTION:

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. Clean unit prior to final inspection.

END OF SECTION

SECTION 14 45 00

VEHICLE LIFTS

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section specifies furnishing, installing, and testing of in-ground axle engaging, one-post, two-post and three-post lift systems, and recessed vertical lift at locations indicated on the Drawings. Vehicle lifts including safety equipment, controls and accessories of the following types:

1. 4713: 10,000 lbs Vehicle Lift

B. Related requirements:

1. Concrete - Division 3
2. Plumbing - Division 22
3. Electrical - Division 26

1.2 QUALITY ASSURANCE

A. Model numbers indicated are to establish a minimum standard of quality only.

B. Substitutions: To be provided in accordance with requirements listed in Section 01600/1.06

1.3 REFERENCES

A. ALI: Automotive Lift Institute.

B. ANSI/ALI ALCTV: Safety Requirements for the Construction, Testing, and Validation of Automotive Lifts.

C. International Standards Organization (ISO): ISO 9001 Quality management systems - Requirements.

D. Underwriters Laboratories Inc. (UL): UL201 - These requirements cover garage equipment, rated not more than 600 volts, for use in accordance with the National Electrical Code, NFPA 70.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation manual.
4. Operations manual.
5. Maintenance manual.
6. Safety manual.

C. Shop Drawings: Template drawings and load reactions for lift application.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Factory trained authorized company, company insured for completed operations of installing lift.
- B. In addition to the other requirements outlined herein, the lift or lifts, shall comply with all applicable requirements of ANSI standards. "Safety Requirements for the Construction, Care and Use of Automotive Lifts" as published by the American national Standards Institute. The lift company Quality Management System shall be ISO9001 certified.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty for failures due to defective materials and workmanship. Manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor.
- B. Following completion, the Contractor shall provide the Owner with a one (1) year warranty starting at project acceptance, covering all parts, materials, and labor. All warranty work shall be performed by a local manufacturer's representative at the project site location, who has capabilities of responding to all problems within 24 hours. Any shipping and delivery costs associated with the warranty of this equipment shall be the responsibility of the Contractor.

PART 2 – PRODUCTS

2.1 LIFT, SURFACE MOUNTED, ASYMETRICAL, 10,000 POUND

- A. Equipment Identifier: 4713
- B. Manufacturer's Reference:
 - 1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction:
 - a. Rotary Lift
2700 Lanier Drive,
Madison, Indiana 47250
Tel: (812) 273-1622
Model No.: SPOA10

2. Alternate manufacturers: Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.
 - a. Challenger Lift
2311 S Park Rd
Louisville, KY
(800) 648-3438
- C. Capacities/Dimensions:
1. Overall Dimensions, Nominal (inches)
 - a. Length: 137-1/2"
 - b. Width: 101-3/4"
 - c. Height: 140-1/2"
 2. Lift rise: 76-7/8"
 3. Drive-through clearance: 95-1/4 inches
 4. Floor to overhead switch bar: 11 feet, 2-3/4 inches
 5. Arm reach:
 - a. Front: 20-1/2 inches minimum, 40-7/8 inches maximum
 - b. Rear: 34-1/2 inches minimum, 58-1/4 inches maximum
 6. Minimum adapter height: 4-3/4" inches (floor to top of adapter)
 7. Adapter height with low extension: 7 inches (floor to top of adapter)
 8. Adapter height with high extension: 10-1/4" inches (floor to top of adapter)
 9. Capacity: 10,000 pounds
- D. Features/Performance/Construction:
1. Each column shall be manufactured of one-piece formed steel having a thickness of not less than 1/4 inch. Column design shall place the carriage bearing surfaces to the back of the column.
 - a. Each column shall contain one carriage having four bearing slider blocks manufactured from a Tivar 1000 Ultra High Molecular Weight polyethylene. Each bearing block shall have a bearing area of a minimum of 22 square inches each and spaced at a minimum of 30-1/4 inches.
 - b. Each column shall be factory rotated 30 degrees to produce a genuine asymmetrical design in order to maintain proper balance between the centerline of the lifting columns and vehicle center of gravity.
 2. Each of the two assemblies shall contain a locking latch mechanism, external of the assemblies, for ease of service, which automatically sets at 4-1/4 inch increments after the first 18-1/2 inches of travel, continuing through full rise. The dual locking latch system shall have a single point release located near the power unit controls for operator convenience. The latches shall be spring actuated to automatically reset when the latch handle is released. There shall be no less than 13 locking positions per assembly.
 3. Each column shall contain one 68-inch stroke hydraulic cylinder with manual air bleeder at the upper end of the cylinder. The rod diameter of the cylinder shall not be less than 1-1/2 inches with a cylinder bore of not less than 2 inches. Each hydraulic cylinder shall be designed with a restrictor orifice to regulate the lowering speed so as not to exceed 20 feet per minute at rated capacity. Cylinder will be installed in such a way that all lifting force is applied directly to column base and is not attached to carriage. Cylinder replacement can be achieved without any disassembly of columns, column extensions, or

- overhead assembly.
4. Column base plate and anchor orientation shall be designed to maximize the effectiveness of each anchor.
 5. Arm/adapter assemblies:
 - a. Unit shall consist of four telescoping 3-stage swing arm assemblies.
 - b. Each arm assembly shall have an adapter base which is laterally adjustable and equipped with a 360-degree rotating, three-height position vehicle contact adapter.
 - c. The vehicle contact adapter shall be capable of accommodating optional adapters for special lifting applications. Optional adapters must fit over the standard adapter and be fitted in place with a detent pin.
 - d. Each arm shall be equipped with an arm restraint feature capable of withstanding
 6. 150 pounds of horizontal force. The restraint engages when the carriage has been raised one inch and automatically releases when fully lowered. Floor-mounted three-position wheel spotting dish shall be supplied to facilitate proper vehicle positioning and load distribution on the arms.
 7. The lift shall be equipped with a mechanical equalization system to keep the two lifting carriages reasonably level at all stages of travel. The equalization shall consist of adjustable cables and sheaves with self lubricating bearings. The equalizer cables are used to laterally synchronize the load. They are not used as suspension cables to raise or support the load (this is accomplished by the two full rise hydraulic cylinders).
 8. The lift shall be equipped with a padded overhead trip bar which actuates a limit switch wired to interrupt the power to the power unit should a vehicle contact the trip bar.
 9. The equalization cables and hydraulic hoses shall be routed overhead to provide a clear floor work area under the vehicle.
- E. Controls: The power unit shall be self contained. Controls shall be “dead-man” type push button “up” and lowering for descent. Standard power unit shall be weather resistant (suitable for outdoor use).
- F. Utility Requirements
1. Electrical Connection Requirements
 - a. Voltage: 208
 - b. Phase: 1
 - c. HP: 2
- G. Finish: Durable enamel in manufacturer’s standard color

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until supporting structures have been properly prepared.
- B. If supporting structure preparation is the responsibility of another installer, notify Owner's Rep of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

- A. Install in strict accordance with manufacturer instructions and in proper relationship with adjacent construction. Test for proper operation and retest if necessary until satisfactory results are achieved.

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Above ground piping.
- B. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler systems.
- C. Expansion joints.
- D. Pipe hangers and supports.

1.2 RELATED REQUIREMENTS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. Section 21 05 23 - General-Duty Valves for Water-Based Fire-Suppression Piping.
- C. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment: Piping identification.
- D. Section 21 07 19 - Fire Suppression Piping Insulation
- E. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.
- F. Division 22 - Plumbing
- G. Division 23 - HVAC
- H. Division 26 - Electrical
- I. Division 28 - Electronic Safety and Security

1.3 REFERENCE STANDARDS

- A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2010.
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.
- C. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2011.
- D. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2013.
- E. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings; 2012.
- F. ASME B16.11 - Forged Fittings, Socket-welding and Threaded; 2011.
- G. ASME B16.25 - Buttwelding Ends; 2012.
- H. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).

- I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- J. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2009 (Reapproved 2014).
- K. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- L. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.
- M. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2013.
- N. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2013.
- O. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.
- P. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2012.
- Q. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2012.
- R. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2009.
- S. ITS (DIR) - Directory of Listed Products; current edition.
- T. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.
- U. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances, 2016
- V. NFPA 25 - Inspection, Testing, and Maintenance of Water Based Fire Protection Systems, 2014
- W. NFPA 33 - Standard for Spray Applications Using Flammable or Combustible Materials, 2016
- X. NFPA 72 - National Fire Alarm and Signaling Code, 2016
- Y. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information. Indicate valve data and ratings.
 - 1. Include items listed in product section and additional items required to provide complete installation.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, seismic restraints and calculations, and piping connections.
- C. Review of submittals does not relieve Contractor from coordinating installation of work with other trades, or from compliance with Codes and Standards.
- D. Project Record Documents: Record actual locations of components and tag numbering.
- E. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Fabrication shop must provide welding certifications and copy of weld stamp. Weld stamp to be provided on all pipe at welds.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.
- D. Comply with FM (AG) and UL (DIR) requirements.
- E. Valves: Bear FM (AG) and UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- F. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
- G. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers, with labeling in place.
- B. All materials shall be stored in a clean, dry space.
- C. Promptly inspect shipments to insure material is undamaged and complies with Specifications. Storage and protection methods must allow inspection to verify products.
- D. Furnish pipe with plastic end-caps/plugs on each end of pipe. Maintain end-caps/plugs through shipping, storage and handling, and installation to prevent pipe-end damage and to eliminate dirt and construction debris from accumulating inside of pipe. Protect fittings and unions by storage inside or by durable, waterproof, aboveground packaging.
- E. Cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade.
- F. Provide temporary protective coating on cast iron and steel valves.
- G. Offsite storage agreements will not relieve Contractor from using proper storage techniques.

PART 2 PRODUCTS

2.1 FIRE PROTECTION SYSTEMS

- A. Sprinkler Systems: Conform work to NFPA 13, CFC, and DSA requirements.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- C. Unless otherwise shown, products shall be UL Listed in the latest publication of the UL Fire Protection Equipment Directory or approved in the latest Factory Mutual Research Corporation Approval Guide for service intended.

2.2 BURIED PIPING:

Piping to 5'-0" outside building face

- A. Ames ES.A - Series IBR - In Building Riser
- B. Ductile Iron Pipe: AWWA C151/A21.51.
 - 1. Class 52, American Water Works Association (AWWA) C151, minimum 350 psi working pressure, with standard cement mortar lining, AWWA C104, American National Standards Institute (ANSI) A21.4
 - 2. Fittings: AWWA C110/A21.10, Ductile iron or grey iron, mechanical joint, 350 psi working pressure, AWWA C153, cement mortar lined, AWWA C104
 - 3. Joints: AWWA C111/A21.11, styrene-butadiene rubber (SBR) or vulcanized SBR gasket.
 - 4. Encasement: Polyethylene encasement, 0.2 mm(8 mil) thick, AWWA C105

2.3 ABOVE GROUND PIPING

- A. Steel Pipe: For pipe sizes 2" and smaller, ASTM A53 Schedule 40 or ASTM A795 Schedule 40, black.
 - 1. Steel Fittings: ASME B16.9, wrought steel, buttwelded, ASME B16.25, buttweld ends, ASTM A234/A234M, wrought carbon steel or alloy steel, ASME B16.5, steel flanges and fittings, or ASME B16.11, forged steel socket welded and threaded.
 - a. Schedule 10 Pipe: Shall be U.L. approved with U.L. approved grooved fittings and couplings for pipe sizes 2-1/2" and larger only. Schedule 10 pipe shall not be used for pipe sizes less than 2-1/2". Threaded fittings shall not be used for any Schedule 10 pipe.
 - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
 - 3. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
 - 4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
 - 5. Ductile Iron threaded fittings shall not be used.
 - 6. Mechanical formed fittings, including, but not limited to, tees, saddle fittings, bushings and mechanical sprinkler head fittings shall not be used.
- B. Steel Pipe: For pipe sizes 2-1/2" and larger, ASTM A795 Schedule 10 or ASTM A135/A135M Schedule 10, black.
 - 1. Steel Fittings: ASME B16.9, wrought steel, buttwelded, ASME B16.25, buttweld ends, or ASTM A234/A234M, wrought carbon steel or alloy steel.
 - a. Schedule 10 Pipe: Shall be U.L. approved with U.L. approved grooved fittings and couplings. Schedule 10 pipe shall not be used for pipe sizes less than 2-1/2". Threaded fittings shall not be used for any Schedule 10 pipe.

2. Ductile Iron or Malleable Iron roll grooved fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
 3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
 4. Mechanical formed fittings, including, but not limited to, tees, saddle fittings, bushings and mechanical sprinkler head fittings shall not be used.
- C. Steel Pipe: Galvanized pipe for all pipe sizes, ASTM A53 Schedule 40 or ASTM A795 Schedule 40, galvanized.
1. All fittings attached to galvanized pipe shall also be galvanized.

2.4 PIPE HANGERS AND SUPPORTS

- A. Provide all attachments, hanger rod, hanger rings, clamps and seismic bracing with a zinc coating or a galvanized finish. No black or plain finish is permitted.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
1. Manufacturers:
 - a. Tolco; www.tolco.com.
- C. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, split ring.
1. Manufacturers:
 - a. Tolco; www.tolco.com.
- D. Vertical Support: Steel riser clamp.
1. Manufacturers:
 - a. Anvil International; Fig 40: www.anvilintl.com/#sle.
- E. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
1. Manufacturers:
 - a. Anvil International; Fig 264: www.anvilintl.com/#sle.
- F. Seismic Hangers and Couplings:
1. Manufacturers:
 - a. Tolco; www.tolco.com.

2.5 EXPANSION JOINTS - HOSE AND BRAID

- A. Manufacturers:
1. The Metraflex Company; FireLoop: www.metrafire.com/#sle.
- B. Provide flexible loops with two flexible sections of hose and braid, two 90-degree elbows, and 180-degree return with support bracket and air release or drain plug.

- C. Provide flexible loops capable of movement in the x, y, and z planes. Flexible loops to impart no thrust loads to the building structure.

2.6 ZONE CONTROL VALVES

- A. Outside screw and yoke or butterfly, U.L. listed.
- B. Valves shall be sealed open using approved seal.
- C. Provide weatherproof actuator housing with two single pole double throw switches.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Pipe Hangers and Supports:
 - 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 2. Place hangers within 12 inches of each horizontal elbow.
 - 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Slope piping and arrange systems to drain at low points.
- H. Prepare pipe, fittings, supports, and accessories for finish painting.
- I. Do not penetrate building structural members unless indicated.
- J. Locate flexible expansion loops at or near the building seismic joint.

- K. Provide sleeves when penetrating footings, floors, and walls. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
 - 2. Aboveground Piping:
 - a. Pack solid using mineral fiber complying with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 - 3. All Rated Openings: Caulk tight with firestopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.
 - 4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- L. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 - 3. Locate piping in center of sleeve or penetration.
 - 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 - 5. Tighten bolting for a watertight seal.
 - 6. Install in accordance with manufacturer's recommendations.
- M. Escutcheons:
 - 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
 - 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
 - 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- N. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

3.3 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.
- C. Clean piping both internally and externally to remove dirt, plaster dust, or other foreign materials. When external surfaces of piping are rusted, clean and restore surface to original

condition. Replacement of heavily soiled and deteriorated materials shall be done at the Contractor's expense.

- D. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

END OF SECTION

SECTION 21 05 23

GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Iron butterfly valves with indicators.
- B. Check valves.
- C. Iron OS&Y gate valves.
- D. NRS gate valves.
- E. Trim and drain valves.

1.2 RELATED REQUIREMENTS

- A. Section 21 05 00 - Common Work Results for Fire Suppression: Pipe and fittings.
- B. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment.
- C. Section 21 13 00 - Fire-Suppression Sprinkler Systems.

1.3 ABBREVIATIONS AND ACRONYMS

- A. EPDM: Ethylene-propylene diene monomer.
- B. NRS: Non-rising stem.
- C. OS&Y: Outside screw and yoke.
- D. PTFE: Polytetrafluoroethylene.

1.4 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013.
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2010.
- C. FM (AG) - FM Approval Guide; current edition.
- D. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.
- E. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances, 2016
- F. NFPA 25 - Inspection, Testing, and Maintenance of Water Based Fire Protection Systems, 2014
- G. NFPA 33 - Standard for Spray Applications Using Flammable or Combustible Materials, 2016
- H. NFPA 72 - National Fire Alarm and Signaling Code, 2016
- I. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.5 SUBMITTALS

- A. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- B. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads and flange faces.
 - 3. Set valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
 - 2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors and maintain at higher than ambient dew point temperature.
 - b. If outdoor storage is unavoidable, store valves off the ground in watertight enclosures.
- C. Use the following precautions for handling:
 - 1. Use sling to handle large valves, rigged to avoid damage to exposed parts.
 - 2. Do not use operating handles or stems as lifting or rigging points.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. UL Listed: Provide valves listed in UL (DIR) bearing UL mark:
- B. Comply with NFPA 13 for valves.
- C. Valve Pressure Ratings: Not less than minimum pressure rating indicated or higher as required.
- D. Valve Sizes: Same as upstream piping unless otherwise indicated.

2.2 IRON BUTTERFLY VALVES WITH INDICATORS

- A. Manufacturers:
 - 1. Kennedy Valve; www.kennedyvalve.com.
- B. Maximum Pressure Rating: 300 psi
- C. Seat: EPDM.

- D. Stem: Stainless steel.
- E. Disc: Ductile iron, nickel plated.
- F. Actuator: Worm gear or traveling nut.
- G. Supervisory Switch: Internal or external.
- H. Body Design: Grooved-end connections.

2.3 CHECK VALVES

- A. Manufacturers:
 - 1. Viking model G-1.
- B. Minimum Pressure Rating: 175 psig.
- C. Type: Center guided check valve.
- D. Body Material: Cast iron, ductile iron.
- E. Center guided check with elastomeric seal.
- F. Hinge Spring: Stainless steel.
- G. End Connections: Flanged, grooved, or threaded.

2.4 TRIM AND DRAIN VALVES

- A. Ball Valves:
 - 1. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Design: Two piece.
 - c. Body Material: Forged brass or bronze.
 - d. Port Size: Full or standard.
 - e. Seat: PTFE.
 - f. Stem: Bronze or stainless steel.
 - g. Ball: Chrome-plated brass.
 - h. Actuator: Hand-lever.
- B. Angle Valves:
 - 1. Manufacturers:
 - a. United Brass Works, Inc.; www.ubw.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Brass or bronze.

- c. Ends: Threaded.
- d. Stem: Bronze.
- e. Disc: Bronze.
- f. Packing: Asbestos free.
- g. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:

- 1. Manufacturers:
 - a. United Brass Works, Inc.; www.ubw.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- 2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Bronze with integral seat and screw-in bonnet.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc Holder and Nut: Bronze.
 - f. Disc Seat: Nitrile.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

D. Test and Drain Valve

- 1. Manufacturers:
 - a. AGF Model 1011A
- 2. Description:
 - a. Pressure Rating: 300 psi
 - b. Body Material: Bronze body, brass stem, impregnated Teflon seat, chrome coated brass ball, and a steel handle with positive stops at the TEST and DRAIN positions
 - c. Components: A tamper resistant test orifice, integral tamper resistant sight glasses, a tapped and plugged port for system access, and a steel identification plate.
 - d. Test Orifice Size: Test Orifice Size: Nominal 5.6K (1/2 inch)
 - e. Pressure Relief Valve: AGF model 7000
 - f. Size: Same as connecting pipe
 - g. Inlet Outlet: Threaded

PART 3 EXECUTION

3.1 EXAMINATION

- A. Confirm valve interior to be free of foreign matter and corrosion.
- B. Remove packing materials.
- C. Examine guides and seats by operating valves from the fully open position to the fully closed position.
- D. Examine valve threads and mating pipe for form and cleanliness.

3.2 INSTALLATION

- A. Comply with specific valve installation requirements and application in the following Sections:
- B. Install listed fire protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections.
- C. Valves in horizontal piping installed with stem at or above the pipe center.
- D. Position valves to allow full stem movement.
- E. Install valve tags. Comply with Section 21 05 53 requirements for valve tags, schedules, and signs on surfaces concealing valves; and the appropriate NFPA standard applying to the piping system in which valves are installed.

END OF SECTION

SECTION 21 05 53

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Ceiling tacks.

1.2 RELATED REQUIREMENTS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.

1.3 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

1.4 SUBMITTALS

- A. Product Data: Provide manufacturers catalog literature for each product required.
- B. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.
- C. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Piping: Tags.

2.2 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.

2.3 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc; _____: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Company; _____: www.kolbipipemarkers.com/#sle.

3. Seton Identification Products, a Tricor Direct Company; _____: www.seton.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
1. Letter Color: White.
 2. Letter Height: Equipment, control panels 1 inch.
 3. Letter Height: Controls and small components, 1/4 inch.
 4. Background Color: Red.

2.4 TAGS

- A. Manufacturers:
1. Advanced Graphic Engraving, LLC; _____: www.advancedgraphicengraving.com/#sle.
 2. Brady Corporation; _____: www.bradycorp.com/#sle.
 3. Brimar Industries, Inc; _____: www.pipemarker.com/#sle.
 4. Craftmark Pipe Markers; _____: www.craftmarkid.com/#sle.
 5. Kolbi Pipe Marker Company; _____: www.kolbipipemarkers.com/#sle.
 6. Seton Identification Products, a Tricor Direct Company; _____: www.seton.com/#sle.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.5 PIPE MARKERS

- A. Manufacturers:
1. Brady Corporation; _____: www.bradycorp.com/#sle.
 2. Brimar Industries, Inc; _____: www.pipemarker.com/#sle.
 3. Craftmark Pipe Markers; _____: www.craftmarkid.com/#sle.
 4. Kolbi Pipe Marker Company; _____: www.kolbipipemarkers.com/#sle.
 5. Seton Identification Products, a Tricor Company; _____: www.seton.com/#sle.
- B. Color: Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Secure to pipe using two (2) bands of adhesive tape with flow arrows supplied by the manufacturer. Install securing bands completely around pipe and overlapped.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Identify valves in main and branch piping with tags.
- G. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 21 07 19

FIRE SUPPRESSION PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 07 84 13 - Firestopping.
- B. Section 21 05 00 - Common Work Results for Fire Suppression
- C. Section 21 05 23 - General Duty Valves for Water Based Fire Suppression Piping
- D. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment
- E. Section 21 13 00 - Fire Suppression Sprinkler Systems

1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- E. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- F. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- G. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- H. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- I. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.
- J. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- K. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010.

- L. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation; 2015.
- M. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- N. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- O. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- P. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville Corporation: www.jm.com/#sle.
 - 3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com/#sle.

4. Owens Corning Corporation; _____: www.ocbuildingspec.com/#sle.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 2. Maximum Service Temperature: 850 degrees F.
 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 2. Maximum Service Temperature: 650 degrees F.
 3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.
- F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- G. Fibrous Glass Fabric:
 1. Cloth: Untreated; 9 oz/sq yd weight.
 2. Blanket: 1.0 lb/cu ft density.
 3. Weave: 5 by 5.
- H. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- I. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- J. Insulating Cement: ASTM C449.

2.3 CELLULAR GLASS

- A. Manufacturers:
 1. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
- B. Pipe and Tube Insulation: ASTM C552, Type II, Grade 6.
 1. K Value: 0.35 at 100 degrees F.
 2. Service Temperature Range: From minus 450 degrees F to 800 degrees F.
 3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
 4. Water Absorption: 0.5 percent by volume, maximum.

2.4 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:

1. Armacell LLC: www.armacell.us/#sle.
2. K-Flex USA LLC: www.kflexusa.com/#sle.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M, Grade 1; use molded tubular material wherever possible.
 1. Minimum Service Temperature: Minus 40 degrees F.
 2. Maximum Service Temperature: 220 degrees F.
 3. Connection: Waterproof vapor barrier adhesive.

2.5 JACKETS

- A. PVC Plastic.
 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
- B. ABS Plastic:
 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: Minus 40 degrees F.
 - b. Maximum Service Temperature of 180 degrees F.
 - c. Moisture Vapor Permeability: 0.012 perm inch, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 30 mil.
 - e. Connections: Brush on welding adhesive.
- C. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
 1. Lagging Adhesive: Compatible with insulation.
- D. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 1. Thickness: 0.016 inch sheet.
 2. Finish: Smooth.
 3. Joining: Longitudinal slip joints and 2 inch laps.
 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.

5. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. Inserts and Shields:
 1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.
- H. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

END OF SECTION

SECTION 21 13 00

FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wet-pipe sprinkler system.
- B. System design, installation, and certification.

1.2 RELATED REQUIREMENTS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. Section 21 05 00 - Common Work Results for Fire Suppression: Pipe and fittings.
- C. Section 21 05 23 - General-Duty Valves for Water-Based Fire-Suppression Piping.
- D. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment.
- E. Section 21 07 19 - Fire Suppression Piping Insulation
- F. Division 22 - Plumbing
- G. Division 23 - HVAC
- H. Division 26 - Electrical
- I. Division 28 - Electronic Safety and Security

1.3 REFERENCE STANDARDS

- A. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.
- B. NFPA 25 - Inspection, Testing, and Maintenance of Water Based Fire Protection Systems, 2014
- C. NFPA 33 - Standard for Spray Applications Using Flammable or Combustible Materials, 2016
- D. NFPA 72 - National Fire Alarm and Signaling Code, 2016
- E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.4 SUBMITTALS

- A. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- B. Shop Drawings: Fire sprinkler system design is not a deferred submittal.
 - 1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.

2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, seismic details and calculations, components and accessories. Indicate system controls.
 3. Submit contractor shop drawings to LP Engineers for approval.
 4. Installation is to conform to approved fire sprinkler plans.
 5. Approved documents do not relieve the contractor of performing installation coordination, creation of installation drawings, or performing clash detection with other trades. It is the fire sprinkler contractors' responsibility to complete and submit installation drawings that meet the approved design intent.
 6. Preparation of installation and fabrication drawings is the responsibility of the fire sprinkler contractor.
- C. **Material Data:** Approved material data is a guideline. The fire sprinkler system design parameters must be strictly adhered to. Alternate manufacturers may be submitted to LP Consulting Engineers, Inc. for review of project compliance. DSA approval must be obtained prior to installation. A copy of the approved material data must be on the project site for the Project Inspector prior to the commencement of installation.
- D. **Manufacturer's Certificate:** Certify that system has been tested and meets or exceeds specified requirements and code requirements.
- E. **Operation and Maintenance Data:** Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
- F. **Maintenance Materials:** Furnish the following for PCCD's use in maintenance of project.
1. **Extra Sprinklers:** Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
 2. **Sprinkler Wrenches:** For each sprinkler type.

1.5 QUALITY ASSURANCE

- A. Maintain one copy of referenced design and installation standard on site.
- B. Conform to UL and FM requirements.
- C. **Manufacturer Qualifications:** Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- D. Fabrication shop must provide welding certifications and copy of weld stamp. Weld stamp to be provided on all pipe at welds.
- E. **Installer Qualifications:** Company specializing in performing the work of this section with minimum five years experience . Installing company must have a valid State of California contractors' license with a C-16 classification.
- F. **Equipment and Components:** Provide products that bear UL and/or FM label or marking.
- G. **Products Requiring Electrical Connection:** Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.6 STRUCTURAL DESIGN REQUIREMENTS AND SEISMIC RESTRAINTS

- A. Fire protection systems and equipment shall be anchored and seismically braced in accordance with all applicable codes and industry standards.
- B. Fire protection systems and equipment shall include, but are not limited to, all piping, valve assemblies, fire pumps, electrical and control panels, conduits and other components.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS - ALL PRODUCTS SHALL CONFORM TO CONTRACT DOCUMENTS INCLUDING APPROVED MATERIAL DATA.

2.1 MANUFACTURERS

- A. Sprinklers, Valves, and Equipment:
 - 1. Anvil International: www.anvilintl.com/#sle.
 - 2. Viking Corporation: www.vikinggroupinc.com/#sle.
 - 3. Victaulic Fire Protection Products: www.victaulic.com

2.2 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for building areas noted on Drawings, including all areas, rooms, spaces above and below ceilings, entry ways, overhangs (if applicable), and all other areas requiring sprinklers in accordance with NFPA 13.
- B. Occupancy: Paint Booth - Extra Hazard Group 2; comply with NFPA 13 and NFPA 33.
- C. Occupancy: Shop areas, engine repair areas, welding areas, fabrication shop areas, storage rooms, electrical room, mechanical rooms, janitor closets, and back of house spaces - Ordinary hazard, Group 2; comply with NFPA 13.
- D. Occupancy: Classrooms, offices, restrooms, dining rooms, meeting rooms, and common spaces with light fire load - Light hazard; Comply with NFPA 13.
- E. Interface system with building fire and smoke alarm system.
- F. Provide drain connections where indicated.
- G. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to fire sprinkler riser. Supply no less than two (2) spare sprinklers of each type and temperature rating used on project. Storage cabinet to include a wrench(s) applicable to sprinkler types.

2.3 SPRINKLERS

- A. Finished Ceiling Type: Concealed pendant type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Finish: Brass.

4. Escutcheon Plate Finish: White Finish.
 5. Fusible Link: Glass bulb type temperature rated for specific area hazard.
 6. Temperature Rating: Ordinary temperature rating 155F
 7. Manufacturers:
 - a. Viking; vikinggroupinc.com.
 8. Application: All finished ceilings
 9. Installed on return bends or with Flexhead flexible sprinkler drop
- B. Exposed Area Type: Upright type.
1. Response Type: Quick.
 2. Coverage Type: Standard.
 3. Finish: Brass.
 4. Fusible Link: Glass bulb type temperature rated for specific area hazard.
 5. Temperature Rating: Intermediate temperature rating 200F
 6. Manufacturers:
 - a. Viking; vikinggroupinc.com.
 7. Application: Areas with exposed construction
- C. Areas exposed to outside elements: Upright .
1. Response Type: Quick.
 2. Coverage Type: Standard.
 3. Finish: White Polyester Finished.
 4. Fusible Link: Glass bulb type temperature rated for specific area hazard.
 5. Temperature Rating: Intermediate temperature rating 200F
 6. Manufacturers:
 - a. Viking; vikinggroupinc.com.
 7. Application: Areas with exposed construction
- D. Sidewall Type: Exposed horizontal sidewall type with matching escutcheon plate when required.
1. Response Type: Quick.
 2. Coverage Type: Standard.
 3. Finish: Brass.
 4. Fusible Link: Glass bulb type temperature rated for specific area hazard.
 5. Manufacturers:
 - a. Viking; vikinggroupinc.com.
- E. Duct Sprinklers: Recessed pendant type with matching push on escutcheon plate.

1. Response Type: Quick.
 2. Coverage Type: Standard.
 3. Finish: white polyester.
 4. Fusible Link: Fusible solder link type with ordinary temperature rating 155F.
 5. Manufacturers:
 - a. Viking; vikinggroupinc.com.
- F. Flexible Drop System: Stainless steel, braided hose, fully welded assembly.
1. Application: Use to properly locate sprinkler heads in center of ceiling tiles.
 2. Include all supports and bracing.
 3. Provide braided type tube as required for the application.
 4. Manufacturers:
 - a. FlexHead Industries, a brand of Anvil International: www.anvilintl.com/#sle.
 - b. Models 2024T-50, 2036T-50, or 2048T-50 straight hoses only.

2.4 PIPING SPECIALTIES

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber-faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
1. Activate electric alarm.
 2. Test and drain valve.
 3. Replaceable internal components without removing valve from installed position.
- B. Zone Control Valves
1. Outside screw and yoke or butterfly, U.L. listed.
 2. Valves shall be sealed open using approved seal.
 3. Provide weatherproof actuator housing with two single pole double throw switches.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standards, DSA requirements and DSA approved plans.
- B. Approved documents do not relieve the fire sprinkler contractor of field coordination. It is the fire sprinkler contractors' responsibility to coordinate piping locations with the work of other trades.
- C. Strict adherence to the contract design documents is required. Any deviation from the contract documents requiring additional plan review, hydraulic calculations, structural review or calculations, or seismic calculations, shall be submitted to LP Consulting Engineers, Inc. for

review prior to making changes. LP Consulting Engineers, Inc. to provide calculations and updated plans for DSA approval.

- D. Install equipment in accordance with manufacturer's instructions.
- E. Preparation of installation and fabrication drawings is the responsibility of the fire sprinkler contractor.
- F. Locate outside horn strobe on building wall outside fire riser room as indicated on Fire Sprinkler Shop Drawings.
- G. Place pipe runs to minimize obstruction to other work.
- H. Place piping in concealed spaces above finished ceilings.
- I. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
- J. All pendent or horizontal sidewall sprinklers are to be installed on return bends or on the side of branch lines. No bottom takeoff to ceiling sprinklers will be permitted.
- K. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting.
- L. Flush entire piping system of foreign matter.
- M. Install head guards where sprinkler heads are exposed in electrical rooms, IT rooms, or where sprinklers are located above or below mezzanines where there is potential of them being impacted. Sprinkler protection below obstructions in mechanical spaces shall be provided with head guards.
- N. Hydrostatically test entire system.
- O. Required test to be witnessed by Fire Marshal.
- P. Verification of weld inspection required prior to installation of fire sprinkler system.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION

SECTION 22 05 10

PLUMBING GENERAL PROVISIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. References.
- B. Description of Work.
- C. Drawings and Specifications.
- D. Industry Standards and Codes.
- E. Site Examination.
- F. Permits, Fees and Utility Connections.
- G. Coordination of Work.
- H. Progress of Work.
- I. Submittals
- J. Operation and Maintenance Manuals.
- K. Project Record Documents.
- L. Warranty.
- M. Quality and Care
- N. Access Doors.
- O. Starting Equipment and Systems.

1.2 RELATED SECTIONS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
- C. The requirements of this Section apply to all Work of Division 23.
- D. Section 013300 - Submittals.
- E. Section 017700 – Contract Closeout

1.3 REFERENCES

- A. ANSI - American National Standards Institute.
- B. ASTM - American Society for Testing Materials.

- C. CEC - California Electric Code.
- D. NEC - National Electric Code.
- E. NEMA - National Electric Manufacturers' Association.
- F. NFPA - National Fire Protection Association.
- G. OSHA - Occupational Safety and Health Act.
- H. UL - Underwriters' Laboratories.
- I. See detailed References that are listed in individual sections.

1.4 DESCRIPTION OF WORK

- A. The work included in this division of the specifications consists of furnishing labor, tools, equipment, supplies and materials, unless otherwise specified, and in performing operations necessary for the installation of the complete Plumbing System as required by these specifications or shown on the Drawings, subject to the terms and conditions of the Contract Agreement.
- B. The work shall also include the completion of details of plumbing work not mentioned or shown which are necessary for the successful operation of mechanical systems described on the drawings or required by these specifications. Furnish and install any incidental work not shown or specified which is required to provide a complete and operational system.

1.5 DRAWINGS AND SPECIFICATIONS

- A. Drawings are schematic and diagrammatic. Drawings indicate the general arrangement of equipment, piping, and other plumbing work. Use judgement and care to install mechanical work to fit the job conditions within the building construction and finishes, and to function properly.
- B. The Contractor shall investigate the building conditions affecting the Work and shall arrange his work accordingly providing offsets, fittings, valves and accessories to fit the actual job conditions. The Contractor shall be responsible to field measure and confirm new and existing mechanical systems locations with respect to other architectural, structural, and electrical work, existing and new. Do not scale distances off of the mechanical drawings. Use actual building dimensions.
- C. The drawings and specifications are complimentary each to the other. What is required by one shall be as binding as if called for by both.
- D. Examine all drawings and specifications prior to bidding the Work. Report any discrepancies to the Engineer.

1.6 INDUSTRY STANDARDS AND CODES

- A. The Mechanical Contractor shall comply with the latest provisions of all codes, regulations, laws and ordinances applicable to the work involved. This does not relieve the Contractor from furnishing and installing work shown or specified which may exceed the requirements of such codes, regulations laws and ordinances.
- B. All materials, products, devices, fixtures forms or types of construction included in this project shall meet or exceed the published requirements of the publications listed below. These publications form a part of this specification.

1. California Building Code, 2019.
 2. California Mechanical Code, 2019.
 3. California Plumbing Code, 2019.
 4. California Electrical Code, 2019.
 5. National Fire Protection Association.
 6. California Fire Code, 2019.
 7. California State Fire Marshal.
 8. Occupational Safety and Health Administration, including CAL-OSHA.
 9. California Energy Code, 2019.
 10. California Green Building Standards Code, 2019.
 11. State of California Code of Regulations, Title 24.
 12. Other applicable state laws.
- C. Nothing in the Drawings or Specifications shall be construed to permit work that does not conform these codes. When Contract Documents differ from governing codes, furnish and install to the higher standard required at no extra charge. The Contract Documents are not intended to repeat the code requirements except where necessary for clarity.
- D. No material or product installed as a part of the Work shall contain asbestos in any form.
- E. Domestic water piping and components shall be provided and installed in accordance with California AB 1953 Legislation (effective January 1, 2010), which limits the allowable lead content in certain domestic water system components.

1.7 SITE EXAMINATION

- A. Contractor shall examine the site, verify dimensions and locations with Drawings, check utility connection locations, and familiarize himself with the existing conditions and limitations. No extras will be allowed because of the Contractor's misunderstanding of the amount of work involved or his lack of knowledge of any site condition which may affect his work. Any apparent variance of the drawings or specifications from the existing conditions at the site shall be called to the attention of the Engineer immediately.

1.8 PERMITS, FEES AND UTILITY SERVICES

- A. Contractor shall pay for and obtain all permits and service required in the installation of this work.
- B. Contractor shall arrange for all required inspections and will secure approvals from authorities having jurisdiction.

1.9 COORDINATION OF WORK

- A. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work and that such establishment is the exclusive responsibility of the contractor.

- B. The Contractor shall give careful consideration to the work of the General, Electrical and other contractors on the job and shall organize his work so that it will not interfere with the work of other trades. He shall consult the drawings and specifications for work of other trades for correcting information, and the pertinent drawings for details and dimensions.
- C. Arrange plumbing work in a neat, well-organized manner with the piping and similar services running parallel and/or perpendicular to primary lines of the building construction. Locate operating and control equipment properly to provide easy access, and arrange entire mechanical work with adequate access for operation and maintenance.
- D. Verify the location of all equipment, plumbing devices, etc. and if interference develops, the Owner/Engineer's decision will be final and no additional compensation will be allowed for the moving of misplaced air devices or equipment.

1.10 PROGRESS OF WORK

- A. This Contractor shall organize his work so that the progress of the mechanical work will conform to the progress of the other trades, and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from defective or ill timed work performed under this section shall be borne by this Contractor.

1.11 STRUCTURAL DESIGN REQUIREMENTS AND SEISMIC RESTRAINTS

- A. Plumbing systems and equipment shall be anchored and seismically braced in accordance with all applicable codes and industry standards.
- B. Plumbing systems and equipment shall include, but are not limited to, all piping, water heaters, expansion tanks, air compressors, vacuum pumps, electrical and control panels, conduits and other components.
- C. Supports, anchorage and restraints, including attachments to building structure, for all piping for standard installation details that comply with the latest edition of the latest edition of the Mason Industries "Seismic Restraint Guidelines", or equal, shall be used wherever possible. The Contractor shall provide all supporting documentation required for the Engineer and the reviewing authorities. If compliance with one of these standards is demonstrated, separate structural calculations are not required.

1.12 SUBMITTALS

- A. See Section 013300 - Submittals, for additional submittal procedures.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project.
- D. Organize submittals in sequence according to Specification Section. Submit in bound document with tabs identifying each Specification Section. Provide a Table of Contents identifying the Specifications Sections being submitted and the contents within each tabbed section. Prepare Submittals in multiple volumes if required. Provide a complete Submittal package at one time. Do not submit individual Sections piecemeal.
- E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

- F. Furnish, upon request, installation instructions for all equipment and materials to Inspector of Record prior to installation.
- G. Maintain a copy of the fire penetration installation instructions on site for use by the Inspector of Record.

1.13 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. LP Consulting Engineers, Inc. will consider requests for substitutions only within 7 days after date of Agreement.
- C. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- D. Failure by the Contractor to order materials or equipment in a timely manner will not constitute justification for a substitution.
- E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- F. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to PCCD.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse PCCD and LP Consulting Engineers, Inc. for review or redesign services associated with reapproval by authorities including obtaining reapproval by authorities.
- G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- H. If excessive review, as judged by the Engineer, is required caused by complicated, numerous or repetitive requests, Contractor shall reimburse Engineer and its Consultants for such review at their standard billing rates.
- I. Substitution Submittal Procedure:
 - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. The LP Consulting Engineers, Inc. will notify Contractor in writing of decision to accept or reject request.

4. Present each substitution individually. If a proposed substitute is not found to be acceptable, then the specified item shall be supplied.

1.14 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01700 Closeout Submittals for Operation and Maintenance Manual requirements.
- B. Provide operating and maintenance instructions, diagrams and parts lists for all components of all mechanical systems and each piece of equipment furnished under these specifications.
- C. Operating and maintenance instructions shall be furnished for the following equipment and systems:
 1. Plumbing Systems.
 2. Medical Gas Equipment, Piping and Alarm Systems.
 3. Piping Systems.
 4. Temperature Controls Systems.
 5. Testing, Adjusting, and Balancing Reports.
- D. Provide manufacturer's model number, design data, capacities, etc. for each piece of plumbing equipment furnished as a part of the Work.
- E. The operating instructions shall include procedures for starting, stopping and emergency manual operation for all equipment and systems.
- F. Provide maintenance instructions of each item of individual equipment including applicable maintenance data as recommended by the manufacturer, including frequency of lubrication, lubricants, inspections required, adjustment procedures, belt and pulley sizes, etc.
- G. Provide manufacturer's parts bulletins with part numbers for each item of equipment included in the Work. Parts bulletins shall be specific to the equipment provided. Extraneous information that does not apply to the equipment provided shall be eliminated from the literature.
- H. Include copies of test reports (startup, check, etc.) and inspections performed for each piece of equipment provided in the Work.
- I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in PCCD's name and registered with manufacturer.
- J. Provide supplier and manufacturer contacts, telephone numbers and addresses in the front portion of the operation and maintenance manual.

1.15 PROJECT RECORD DOCUMENTS

- A. See Section 017700 - Closeout Procedures.
- B. Provide red-lined drawings accurately showing location of equipment and devices and size and routing of piping. Include notes explaining installed condition for complete understanding.

1.16 QUALITY ASSURANCE

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.

- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from LP Consulting Engineers, Inc. before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

1.17 PROJECT CONDITIONS

- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.18 WARRANTY

- A. See Section 01700 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 QUALITY AND CARE

- A. All materials shall be new and in perfect condition when installed unless specifically indicated otherwise. Materials shall be tested within the Continental United States by an independent, nationally recognized testing agency and shall be listed in accordance with testing agency requirements. When not otherwise specified, all material shall conform to applicable National Standards (ANSI).
- B. All capacities, sizes and efficiency ratings shown on the drawing are minimum. Gas meter and gas pressure reducing valve capacities are maximum allowable.
- C. Each category of material or equipment shall be of the same brand or manufacturer throughout the Work wherever possible.
- D. The quality of materials and equipment to be provided is defined by the brand names, manufacturers, model and catalog numbers listed on the Drawings and in the Specifications. Contractor shall provide each item listed, of the quality specified, or equal.
- E. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable Installation and Maintenance Manuals.
- F. Inspect and report concealed damage to carrier within their required time period.
- G. Store materials in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or heavy plastic cover to protect from dirt, water, construction debris, and traffic.

- H. Equipment which has been damaged, exposed to weather or is, in the opinion of the Engineer or Owner, otherwise unsuitable because of improper fabrication, storage or installation shall be removed and replaced by this Contractor at his expense.

2.2 ACCESS DOORS

- A. Coordinate access door requirements with Section 08305. The more stringent requirements shall govern.
- B. Provide access doors where access through floors, walls or ceilings is required to access plumbing equipment and plumbing devices or other systems requiring access for maintenance, test or observation.
 - 1. Access doors requiring hand access or access for observation only shall be 14"x14" minimum usable opening.
 - 2. Access doors where entrance of a service person may be required shall be 24"x30" minimum usable opening.
- C. Established standard: Milcor of types listed below. Other acceptable manufacturers: Cesco, J.L. Industries, Karp, Larsen's, or equal. Comply with the following:
 - 1. Form doors and frames of welded, ground smooth steel construction, 14 gauge for doors, 16 gauge for frames. Provide prime coat finish except for stainless steel type.
 - 2. Concealed hinges to allow 175 degree opening.
 - 3. Locks: flush, screw driver operated cam lock(s).
 - 4. Provide anchoring devices suitable for the construction into which the doors are framed.
- D. Application (as applicable):
 - 1. In gypsum drywall walls and ceilings: Type DW.
 - 2. In ceramic tile walls: Type MS (stainless steel).
 - 3. In fire rated walls: Type Fire Rated (rating as required for wall or ceiling), self closing, 250 F in 30 min. temperature rating.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Access Doors
 - 1. Coordinate the exact location of access doors to provide proper access to the item concealed. Obtain written approval for access door locations from Architect.
 - 2. Coordinate installation of access doors with the trades performing the construction assemblies into which the access doors are placed.
 - 3. Install all access doors neatly and securely, to open and close completely, and to operate freely and without binding. Install rated doors in accordance with their listing requirements.
 - 4. Test operate all doors and make all adjustments required for satisfactory operation. Replace all damaged materials.

5. Install in accordance with manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with the requirements within this section.
- B. Test all piping with no leak or loss in pressure in accordance with the requirements within this section.

3.3 GENERAL TESTING REQUIREMENTS FOR MECHANICAL AND PLUMBING SYSTEMS

- A. Contractor shall assign a responsible person to be an independent representative to witness testing and to sign as witness of times, pressure and losses of testing media for all hydronic, duct and gas piping testing.
 1. Test all piping as noted below with no leak or loss of pressure. Repair or replace defective piping until tests are accomplished successfully.
 2. Submit to the Engineer for review a log of all tests made which shall include time, temperature, pressure, water makeup and other applicable readings, necessary to indicate the systems have been operated and tested in the manner outlined in the construction documents.
 3. After producing the specified test pressure, disconnect the pressurizing source; do not introduce further pressure for the duration of the test period, repair leaky piping and retest. Repeat the procedure until the entire system is proven tight.
- B. Test the following systems with the medium listed to the pressure indicated for the time period listed:
 1. Sanitary Sewer, Drain, Vent Piping: Pressure=10 Ft.Hd. / Medium= Water / Duration=4 Hours.
 2. Domestic Water Piping: Pressure=125 Psig / Medium= Water / Duration=4 Hours.
 3. Condensate drains: Pressure=10 Ft.Hd. / Medium=Water / Duration=4 Hours.
 4. Gas Piping: Pressure=60 Psig / Medium=Air and soap / Duration=8 Hours.

3.4 CUTTING AND PATCHING

- A. Submit written request in advance of cutting or alteration which affects:
 1. Structural integrity of any element of Project.
 2. Integrity of weather exposed or moisture resistant element.
 3. Efficiency, maintenance, or safety of any operational element.
 4. Visual qualities of sight exposed elements.
 5. Work of PCCD or separate Contractor.
- B. Execute cutting and patching to complete the work, to uncover work to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.

- C. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- E. Restore work with new Products in accordance with requirements of Contract Documents.
- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Code requirements , to full thickness of the penetrated element.
- H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.5 PRIMING AND PAINTING

- A. Apply primer to all exposed ferrous metals that are not factory primed, factory finished, galvanized, stainless steel or anodized. Exposed black steel piping shall be primed and finish painted, including gas piping outdoors.
 - 1. Primer shall be as recommended by the paint manufacturer for each specific application.
 - 2. Acceptable Products include: Fuller O'Brien Blox-Rust Metal All Purpose Primer, equivalent Rust-Oleum product, or equal. See Section 09900 for other acceptable products.
- B. Apply two coats of primer to metal surfaces of items to be insulated or jacketed, except piping, or factory primed or finished.
- C. Preparation:
 - 1. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
 - 2. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; seal stains and marks which cannot be completely removed using Devoe KILSTAIN primers, shellac, or other coating acceptable to paint manufacturer any marks or defects that might bleed through paint finishes.
 - 3. Remove mildew from impervious surfaces by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow substrate to thoroughly dry.
 - 4. Galvanized Surfaces:
 - a. Remove surface contamination and oils by solvent cleaning in accordance with SSPC-SP 1 and allow to dry.
 - b. Apply Devoe MIRROLAC Galvanized Metal Primer in accordance with manufacturer instructions.
 - 5. Uncoated Steel And Iron Surfaces:
 - a. Remove grease, rust, scale, and dust from steel and iron surfaces using solvent in accordance with SSPC-SP 1.

- b. Where heavy coatings of scale or contaminants are evident, hand tool clean in accordance with SSPC-SP 2 or use other approved SSPC SP method as needed.
- 6. Shop Primed Steel Surfaces: Remove loose primer and dust. Sand and feather edges to smooth surface. Clean areas with solvent and spot prime bare metal surfaces with appropriate Devoe MIRROLAC metal primer or primer recommended by manufacturer.
- D. Application:
 - 1. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.
 - 2. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
 - 3. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
- E. Finish Painting: See Section 09900.

3.6 STARTING EQUIPMENT AND SYSTEMS/COMMISSIONING

- A. Start equipment and systems in accordance with manufacturer's written instructions..
- B. Adjust for proper operation within manufacturer's published tolerances.
- C. Demonstrate proper operation of equipment to PCCD's designated representative.
- D. Description:
 - 1. Comply with all start up of mechanical and electrical equipment systems as required in the various sections and herein.
 - 2. Coordinate all testing and startup procedures with all other trades so that all non-plumbing and non-electrical work is completed and operational so that the specified testing can be performed.
- E. Preliminary Work:
 - 1. Prior to the startup, the Contractor shall ensure that the systems are ready to operate, and the following items have been completed and checked including but not limited to:
 - a. Proper motor and fan/pump rotation.
 - b. Flushing and cleaning of the system.
 - c. Wiring
 - d. Auxiliary connections
 - e. Lubrication.
 - f. Venting.
 - g. Controls.
 - h. Installation of filters and strainers.
 - i. Setting of relief and safety valves .

2. All electrical testing must be completed and test results submitted before equipment startup to avoid power interruptions during mechanical equipment startup and testing.
3. The Contractor shall submit at least 30 days in advance a schedule listing the date of completion of his work as it will be ready for equipment startup of Electrical/Plumbing equipment. This schedule shall include work on a system by system, floor by floor basis.
4. Two weeks prior to the startup of any major equipment, the Contractor shall certify in writing that the systems will be complete and ready for startup. Completeness shall not only include physical installation of individual pieces of equipment, but all related elements of other crafts to make all equipment operate as a system.
 - a. The startup checklist will cover all related crafts, e.g., controls, electrical, plumbing, and a clean environment for equipment startup.
5. The Contractor shall schedule a tour with the Owner's representative and the Engineer to review startup conditions prior to equipment startup. This tour shall take place during the associated Engineer's regularly scheduled visit. This tour does not relieve the Contractor of any responsibilities to properly start equipment. The Engineer will issue a notice of deficiencies that will be required to be corrected prior to equipment startup. The Contractor will be required to reschedule a back check with the Engineer prior to attempting an equipment startup.
6. Equipment of systems should not be started until systems and associated subsystems are completed. Verify that other continuing work could not possibly damage completed systems if they are in operation. Furnish signed off prestartup check sheet.

F. Startup and Commissioning:

1. System Startup and Operation:
 - a. The Contractor shall provide all labor, materials and services necessary for the initial startup and operation of all systems and equipment furnished and installed under this section.
 - b. The Contractor and the factory representative shall check all equipment during initial startup to insure correct rotation, proper lubrication, adequate fluids or air flows, nonoverloading electrical characteristics, proper alignment and vibration isolation. Systems shall be checked for water flows throughout without blockages. Plumbing systems shall be checked for proper connections and positions, nonexcessive electrical characteristics and minimal vibration. Other miscellaneous equipment shall be started and operated as described above as applicable. Manufacturer's representative shall submit a preliminary written copy of equipment startup check sheet prior to leaving job site.
 - c. After initial startup and operation of systems, the Contractor shall submit a report, showing proper operation before commencement of the final "Operation Test".
 - d. During initial operation of the system and until substantial completion, qualified personnel shall be provided and designated for maintaining the equipment and systems in good running order. Items such as strainers, cleanouts, packing replacement, and other consumables shall be provided without cost to the Owner. Failure of equipment during this period due to lack of proper supervision is the responsibility of the Contractor and continued failures shall be grounds for the Owner

to provide such services with back charges to the Contractor. Submit written schedule of completed maintenance to the Engineer.

G. System Acceptance:

1. General: The system installation shall be complete and tested for proper operation prior to acceptance testing "Operation Test" for the Owners authorized representative. A letter shall be submitted to the Engineer requesting system acceptance. This letter shall certify that all controls are installed and the software programs have been completely exercised for proper equipment operation. Acceptance testing shall commence at a mutually agreeable time within ten (10) calendar days of request. When the field test procedures have been demonstrated to the Owner's representative and pass, the system will be accepted. The warranty period may begin at this time.

H. Operation Test:

1. Provide all labor, equipment, and materials required to perform test.
2. The test shall occur after all major equipment startup and balance services have been performed as specified. The purpose is to demonstrate that individual pieces of equipment and all related elements operate as one complete system and not to identify incomplete or defective work.
3. All equipment is to be run in an automatic operating position and exercised for 72 hours to verify that they perform in accordance with the specified sequence of operation and designed operation logic.
4. The Engineer's representative shall be notified and may be present for the initiation of the test.
5. A log shall be prepared by the Contractor, to be submitted to the Engineer, of all tests including, but not limited to: time, temperatures, pressures, and other readings to prove all equipment is operating as specified.
6. All temperatures, pressures, status indication, etc., shall be verified by at least one other means of measurement or visual verification of condition.
7. Change set points and simulate conditions as directed to demonstrate:
 - a. Ability to control to new set point.
 - b. Interface between systems, fire alarm/fire sprinkler systems.
 - c. Proper sequence and operation.
 - d. Equipment safety systems and all automatic changeover/backup systems and alarms are functioning or will function.
8. If unsatisfactory performance or a system failure is experienced for any reason, the test shall be repeated until 72 hour consecutive hours are achieved. The Engineer's representative shall make all final decisions of a satisfactory test.

END OF SECTION

SECTION 22 05 16

EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion/seismic loops and compensators.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 21 05 00 - Common Work Results for Fire Suppression.
- C. Section 22 10 05 - Plumbing Piping.

1.3 REFERENCE STANDARDS

- A. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2013.
- B. ASME B16.11 - Forged Fittings, Socket-welding and Threaded; 2011.
- C. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.
- D. EJMA (STDS) - EJMA Standards; Tenth Edition.

1.4 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Loops/Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Maintenance Data: Include adjustment instructions.

1.5 REGULATORY REQUIREMENTS

- A. Conform to UL and FM requirements.

PART 2 PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A. Manufacturers:
 - 1. Keflex
 - 2. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 3. The Metraflex Company: www.metraflex.com/#sle.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Braided bronze.
- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged or threaded with union.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.
- H. Application: Copper piping.

2.2 EXPANSION LOOPS

- A. Manufacturers:
 - 1. Metraflex Metraloop.
 - 2. Mason.
- B. Provide flexible expansion loops of size to match piping in which installed as shown on the Drawings.
- C. Flexible loops shall be designed to impart no thrust loads on the pipe anchors.
- D. The loop shall consist of two flexible sections of hose and braid, two 90 degree elbows and a 180 degree return. Hose and braid shall be T304 stainless steel. Fittings shall be carbon steel. Provide connection ends to match piping fitting requirements.
- E. Expansion loops shall be designed for 4 inches of movement in all directions and 4" axial movement. Maximum working pressure 150 PSI at 70 degrees.
- F. Install at all locations where piping crosses building seismic expansion joints.
- G. Expansion loops shall be certified for fluid/gas being transported for use in seismic applications.

2.3 ACCESSORIES

- A. Pipe Alignment Guides:
 - 1. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- C. Anchor pipe to building structure where indicated or required. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- D. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.
- E. Install seismic expansion loops at all points where piping crosses building expansion joints.

END OF SECTION

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Applications.
- B. Angle valves.
- C. Ball valves.
- D. Butterfly valves.
- E. Check valves.
- F. Gate valves.
- G. Globe valves.
- H. Plug valves.

1.2 RELATED REQUIREMENTS

- A. Section 08 31 13 - Access Doors and Frames.
- B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- C. Section 22 07 19 - Plumbing Piping Insulation.
- D. Section 22 10 05 - Plumbing Piping.

1.3 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Non-rising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. SWP: Steam working pressure.
- I. TFE: Tetrafluoroethylene.
- J. WOG: Water, oil, and gas.

1.4 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013.

- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2010.
- C. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2013.
- D. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2009.
- E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- F. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2013.
- G. ASME B31.9 - Building Services Piping; 2014.
- H. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
- I. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).
- J. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2014).
- K. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings; 2015.
- L. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2015.
- M. AWWA C606 - Grooved and Shouldered Joints; 2011.
- N. MSS SP-45 - Bypass and Drain Connections; 2003 (Reaffirmed 2008).
- O. MSS SP-67 - Butterfly Valves; 2011.
- P. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends; 2011.
- Q. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011.
- R. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010.
- S. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; 2011.
- T. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
- U. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; 2011.
- V. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- W. MSS SP-125 - Gray Iron and Ductile Iron In-Line, Spring-Loaded, Center-Guided Check Valves; 2010.
- X. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- Y. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

- D. Maintenance Materials: Furnish PCCD with one wrench for every five plug valves, in each size of square plug valve head.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.6 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

PART 2 PRODUCTS

2.1 APPLICATIONS

- A. Provide the following valves for the applications if not indicated on drawings:
 - 1. Shutoff: Ball, butterfly, gate or plug.
 - 2. Throttling: Provide globe, angle, ball, or butterfly.
 - 3. Swing Check (Pump Outlet):
 - a. 2 NPS and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
 - b. 2-1/2 NPS and Larger for Domestic Water: Iron swing check valves with closure control, metal or resilient seat check valves.
 - c. 2-1/2 NPS and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.
- B. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.
- C. Required Valve End Connections for Non-Wafer Types:
 - 1. Steel Pipe:
 - a. 2 NPS and Smaller: Threaded ends.
 - b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - c. Grooved-End Steel Piping: Grooved.
 - 2. Copper Tube:
 - a. 2 NPS and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
- D. Domestic, Hot and Cold Water Valves:
 - 1. All sizes:

- a. Bronze and Brass: Provide with solder-joint or threaded ends.
 - b. Bronze Angle: Class 125, bronze disc.
 - c. Ball: Two piece, full port, brass with brass trim.
 - d. Bronze Swing Check: Class 125, bronze disc.
 - e. Bronze Gate: Class 125, NRS.
- E. Gas Valves:
- 1. All sizes:
 - a. Bronze: Provide with threaded ends.
 - b. Ball: One piece, full port, bronze with bronze trim.
 - c. Lubricated Plug: Class 125, regular gland.

2.2 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:
 - 1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
 - 2. Handwheel: Valves other than quarter-turn types.
 - 3. Hand Lever: Quarter-turn valves 6 NPS and smaller except plug valves.
 - 4. Wrench: Plug valves with square heads.
- D. Valves in Insulated Piping: With 2 NPS stem extensions and the following features:
 - 1. Gate Valves: Rising stem.
 - 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: Extended neck.
 - 4. Memory Stops: Fully adjustable after insulation is installed.
- E. Valve-End Connections:
 - 1. Threaded End Valves: ASME B1.20.1.
 - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
 - 3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
 - 4. Solder Joint Connections: ASME B16.18.
 - 5. Grooved End Connections: AWWA C606.
- F. General ASME Compliance:
 - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.

2. Solder-joint Connections: ASME B16.18.
3. Building Services Piping Valves: ASME B31.9.

G. Potable Water Use:

1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

H. Valve Bypass and Drain Connections: MSS SP-45.

2.3 BRONZE, ANGLE VALVES

A. Class 125: CWP Rating: 200 psig.

1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. Ends: Threaded.
4. Stem: Bronze.
5. Disc: Bronze.
6. Packing: Asbestos free.
7. Handwheel: Bronze or aluminum.

2.4 BRASS, BALL VALVES

A. Two Piece, Full Port with Brass Trim and Threaded or Soldered Connections:

1. Comply with MSS SP-110.
2. SWP Rating: 150 psig.
3. CWP Rating: 600 psig, WOG.
4. Body: Forged brass.
5. Seats: PTFE.
6. Ball: Chrome-plated brass.

2.5 BRONZE, BALL VALVES

A. General:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Two Piece, Full Port with Bronze Trim:

1. Comply with MSS SP-110.
2. SWP Rating: 150 psig.
3. CWP Rating: 600 psig.
4. Body: Forged bronze or dezincified-brass alloy.

5. Ends: Threaded.
6. Seats: PTFE.
7. Stem: Bronze.
8. Ball: Chrome plated brass.

2.6 BRONZE, LIFT CHECK VALVES

A. General:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125:

1. Comply with MSS SP-80, Type 1, Metal Disc to Metal Seat and Type 2, Nonmetallic Disc to Metal Seat.
2. CWP Rating: 200 psig.
3. Design: Vertical flow.
4. Body: Comply with ASTM B61 or ASTM B62, bronze.
5. Ends: Threaded as indicated.

2.7 BRASS, INLINE CHECK VALVES

- A. Class 150: CWP Rating: 300 psig, WOG.
- B. Maximum Service Temperature: 250 deg F.
- C. Body: Forged brass.
- D. Disc: Forged brass.
- E. Seal: PTFE, bubble-tight.
- F. End-Connections: Threaded.

2.8 BRASS, HORIZONTAL SWING CHECK VALVES

A. Threaded End-Connections:

1. Class 125: CWP Rating: 200 psig, WOG.
2. Body: Forged brass.
3. Disc: Forged brass.
4. Hinge-Pin, Screw, and Cap: Forged brass.

2.9 BRONZE, SWING CHECK VALVES

A. General:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

- B. Class 125 CWP Rating; 200 psig (1,380 kPa) WOG:
 - 1. Comply with MSS SP-80, Type 3.
 - 2. Design: Y-pattern, horizontal or vertical flow.
 - 3. Body: Bronze, ASTM B62.
 - 4. Ends: Threaded.
 - 5. Disc: Bronze.

2.10 BRONZE, GATE VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. NRS (Non-rising Stem) or OS & Y (Rising Stem):
 - 1. Comply with MSS SP-80, Type I.
 - 2. Class 125: CWP Rating 200 psig.
 - 3. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 - 4. Ends: Threaded or solder joint joint.
 - 5. Stem: Bronze.
 - 6. Disc: Solid wedge; bronze.
 - 7. Packing: Asbestos free.
 - 8. Handwheel: Malleable iron, bronze, or aluminum.

2.11 LUBRICATED PLUG VALVES

- A. Regular Gland with Flanged Ends:
 - 1. Comply with MSS SP-78, Type II.
 - 2. Class 125: CWP Rating: 200 psig.
 - 3. Body: ASTM A48/A48M or ASTM A126, cast iron with lubrication sealing system.
 - 4. Pattern: Regular or short.
 - 5. Plug: Cast iron or bronze with sealant groove.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.

- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

3.2 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Install check valves where necessary to maintain direction of flow as follows:
 - 1. Lift Check: Install with stem plumb and vertical.
 - 2. Swing Check: Install horizontal maintaining hinge pin level.
- D. All buried metallic valves shall be coated from the factory (i.e. using powdered epoxy or equivalent type of coating system) and all bolts shall be coated with bitumastic in the field and the entire valve shall be encased in an 8-mil polyethylene bag in accordance with AWWA Specification C-105.
- E. A sacrificial type of cathodic protection utilizing magnesium anodes should be installed to protect buried valves and fittings. Cathodic protection should be designed in accordance with NACE Standard SP0169-13 and applicable local standards and included with the contract documents to permit installation along with the pipeline.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other plumbing work.

1.2 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2013.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- I. MFMA-4 - Metal Framing Standards Publication; 2004.
- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- K. NFPA 101 - Life Safety Code; 2015.
- L. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Submittals.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Comply with MSS SP-58.
2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems:

1. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
 - b. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
3. Comply with MFMA-4.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 1 inch (27 mm) nominal: 3/8 inch diameter.
 - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

D. Thermal Insulated Pipe Supports:

1. General Construction and Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.

- c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
- d. Insulation inserts to consist of calcium silicate insulation surrounded by a 360 degree, PVC jacketing.
- 2. PVC Jacket:
 - a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
 - b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
 - c. Thickness: 60 mil.
- E. Pipe Supports:
 - 1. Liquid Temperatures Up To 122 degrees F:
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
 - 2. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
 - b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
 - c. Sliding Support: MSS SP-58 Types 35 through 38.
- F. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
 - 1. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
 - 2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- G. Riser Clamps:
 - 1. Provide copper plated clamps for copper tubing support.
 - 2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
- H. Offset Pipe Clamps: Double-leg design two-piece pipe clamp.
- I. Strut Clamps: Two-piece pipe clamp.
- J. Insulation Clamps: Two bolt-type clamps designed for installation under insulation.
- K. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
 - 1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 - 2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- L. Pipe Alignment Guides: Galvanized steel.
 - 1. Pipe Diameter 8 inches and Smaller: Spider or sleeve type.
 - 2. Pipe Diameter 10 inches and Larger: Roller type.

- M. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- N. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
 2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 3. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 4. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- O. Pipe Shields for Insulated Piping:
1. General Construction and Requirements:
 - a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
 - b. Shields Material: UV-resistant polypropylene with glass fill.
 - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
 - d. Minimum Service Temperature: Minus 40 degrees F.
 - e. Maximum Service Temperature: 178 degrees F.
 - f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- P. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by LP Consulting Engineers, Inc., do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by LP Consulting Engineers, Inc., do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer and DSA.

- F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

1.3 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.4 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Heat Transfer Equipment: Nameplates.
- B. Major Control Components: Nameplates.
- C. Piping: Pipe markers.
- D. Pumps: Nameplates.
- E. Small-sized Equipment: Tags.
- F. Tanks: Nameplates.
- G. Valves: Tags and ceiling tacks where located above lay-in ceiling.
- H. Water Treatment Devices: Nameplates.

2.2 MANUFACTURERS

- A. Brady Corp.
- B. Seton Identification Products.

2.3 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.
 - 4. Plastic: Comply with ASTM D709.

2.4 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.5 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Secure to pipe using two (2) bands of adhesive tape with flow arrows supplied by the manufacturer. Install securing bands completely around pipe and overlapped.
- C. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- D. Identify domestic hot water heating equipment, including pumps, etc. with plastic nameplates.
- E. Identify valves in main and branch piping with tags.

- F. Identify piping, concealed or exposed, with plastic pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Identify all medium pressure gas piping (over 11" W.C. to 5 PSI pressure) with pressure contained within piping system (for example: "MPG 5 PSI")

END OF SECTION

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- D. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2013.
- E. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- F. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- G. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010.
- H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- J. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.

- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. Knauf Insulation: www.knaufusa.com.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' value: ASTM C 177, 0.22 to 0.28 at 100 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Vapor Barrier Lap Adhesive: Compatible with insulation.

2.3 JACKETS

- A. PVC Plastic.

1. Manufacturers:
 - a. Proto Corporation, Proto-Wrap 30 LoSmoke.
 - b. Johns Manville Corporation: www.jm.com.
 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
 3. Covering Adhesive Mastic: Compatible with insulation.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
1. Thickness: 0.016 inch sheet.
 2. Finish: Embossed.
 3. Joining: Longitudinal slip joints and 2 inch laps.
 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Glass fiber insulated pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with molded PVC fitting covers.
- D. Glass fiber insulated pipes conveying fluids above ambient temperature:
 1. Provide standard jackets, with vapor barrier, factory-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.

2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with molded PVC fitting covers.
- E. Inserts and Shields:
1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- F. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, use a UL rated fire penetration assembly, 3M or equal.
- G. Pipe in Supply Air Plenum or Finished Spaces: Finish with PVC jacket and fitting covers.
- H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.
- I. Exterior Applications (exposed to the weather): Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.3 SCHEDULES

- A. Plumbing Systems:
1. Domestic Hot and Tempered Water Supply:
 - a. Glass Fiber Insulation:
 1. Pipe Size Range: 1 inch and larger.
 - 1.01. Thickness: 1.5 inch.
 2. Pipe Size Range: 3/4 inch and smaller.
 - 2.01. Thickness: 1 inch.
 2. Domestic Cold Water Located in Unheated Areas:
 - a. Glass Fiber Insulation:
 1. Pipe size range: Up to and including 2": Insulation thickness 1".
 2. Pipe size range: Over 2": Insulation thickness 1.5".

END OF SECTION

SECTION 22 08 00

PLUMBING COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to the Work of this Section.
- B. Specific commissioning requirements are given in the following sections of these specifications. It is the contractor's responsibility to coordinate all HVAC systems testing with the GC and all other trades performing related testing services. The division 22 contractor shall provide all T24 required testing by what T24 calls "Certified Acceptance Test Technician". All such tests shall be provided to the districts CxA for inclusion into the CxA reports and submitted according to T24 requirements.
 - 1. 01 91 00 - General Commissioning Requirements
 - 2. 26 08 00 - Electrical Commissioning Requirements
 - 3. 23 08 00 - Mechanical Commissioning Requirements
 - 4. ASHRAE Guideline 0-2019 or superseding ASHRAE guideline
 - 5. Title 24 / 2016 Section 120.8 or superseding CA Title 24 requirement
 - 6. SUBMITALS
 - a. General:
 - 1. Comply with Section –Submittal Procedures.
 - 2. See submittal requirements in Section 01 91 00–General Commissioning Requirements
 - 3. Prior to pre-functional testing:
 - 3.01. Provide a TAB plan for approval by the CxA
 - 3.02. Provide all Pre-Functional Tests for approval to the CxA
 - 7. COORDINATION
 - a. The Contractor shall coordinate all testing and balancing and major equipment startup and installation with the Commissioning Provider (CxA) and the CM.
 - b. For the Plumbing domestic water equipment, the Contractor shall provide a short discussion of the control of the plumbing equipment during the mechanical or electrical training conducted by others.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Trade Contractor for the equipment being tested.
- B. Datalogging equipment or software required to test equipment will be provided by the contractor, if required, but shall not become the property of the Owner.
- C. All testing equipment shall be of sufficient quality and accuracy to test or measure system performance required by the Contract Documents.

PART 3 EXECUTION

3.1 TESTING PREPARATION

- A. General Procedures are described in Section 01 91 00 – General Commissioning Requirements.
- B. Contractor shall perform all pre-functional performance tests with the tests approved by the CxA. The CxA and the owner shall be advised of all tests as required in this section and by the general commissioning requirements in 01 91 00.
- C. Pre-functional Checklists shall be completed and provided to the CxA for the following Plumbing systems:
 - 1. Contractor to develop, fill out and sign approved pre-functional checklists according to 01 91 00 for the following equipment and systems. These tests shall be provided even if the CxA does not provide related Functional performance tests for these systems:
 - a. Domestic Hot Water System
 - b. Potable water system and booster pumps, as applicable
 - 1. Contractor shall certify that Plumbing systems, subsystems, and equipment are completed, calibrated, and started based on the tests verified and approved by the CxA.
- D. FUNCTIONAL PERFORMANCE TESTING
 - 1. General procedures are described in the Division 01 Section "General Commissioning Requirements." 01 91 00
 - 2. Contractor shall execute all functional performance tests provided by the Commissioning Provider. No functional tests shall be performed without the CxA present.
 - 3. The details of the functional performance tests shall be reviewed and refined during the construction phase by the CxA. The final test will be provided to the contractor at least 5 business days before the test is conducted.
- E. ELECTRONIC DOCUMENT REQUIREMENTS
 - 1. All working documents shall be provided in electronic format whenever feasible. Hard copies are only permissible if soft copies of the documents are not available.

2. In addition to the hard copy requirements required in this section, at least all final documents shall be provided un pdf format, organized and tabulated identical to any hard copies provided. Coordinate media requirements with the owner at the time of submission

END OF SECTION

SECTION 22 10 05

PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Drains.
 - 3. Domestic water.
 - 4. Natural Gas
 - 5. Storm water.
 - 6. Flanges, unions, and couplings.
 - 7. Manufactured sleeve-seal systems.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 07 84 13 – Penetration Firestopping.
- C. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping.
- D. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- E. Section 22 07 19 - Plumbing Piping Insulation.

1.3 REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; 2011.
- F. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; 2012.
- G. ASME B31.1 - Power Piping; 2014.
- H. ASME B31.9 - Building Services Piping; 2014.

- I. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2015.
- J. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- K. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2015.
- L. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- M. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- N. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.
- O. ASTM B75/B75M - Standard Specification for Seamless Copper Tube; 2011.
- P. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- Q. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2013.
- R. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.
- S. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).
- T. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings; 2004 (Reapproved 2013).
- U. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2012.
- V. ASTM C700 - Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated; 2013.
- W. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings; 2014.
- X. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2014.
- Y. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).
- Z. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2010.
- AA. AWWA C651 - Disinfecting Water Mains; 2005.
- AB. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009.
- AC. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011.
- AD. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- AE. MSS SP-67 - Butterfly Valves; 2011.

- AF. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- AG. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
- AH. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- AI. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- AJ. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.4 SUBMITTALS

- A. See Section 013300 - Submittal Procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with State of California, standards.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

1.6 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of California plumbing code.
- B. Domestic water piping and components shall be provided and installed in accordance with California AB 1953 Legislation (effective January 1, 2010), which limits the allowable lead content in certain domestic water system components.
- C. Conform to applicable code for installation of backflow prevention devices.
- D. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 SANITARY SEWER PIPING, BURIED

- A. PVC Pipe (Solid Wall): ASTM D1784, ASTM D1785, and ASTM D2665
 - 1. Fittings: PVC
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.3 DRAIN PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- B. Copper Tube: ASTM B 306, DWV or ASTM B 88 (ASTM B 88M), Type M (C), Drawn (H).
 - 1. Application: Condensate drains (non-acidic).
 - 2. Fittings: ASME B16.29, wrought copper, or ASME B16.23, solvent.
 - 3. Joints: ASTM B32, alloy Sn50 solder.
- C. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, using one of the following joint types:
 - 1. Application: Condensate drains outside building (non-acidic).
 - 2. Threaded Joints: ASME B16.3 malleable iron fittings.
- D. PVC Pipe: ASTM D2665.
 - 1. Application: Condensate drains (acidic).
 - 2. Fittings: PVC.
 - 3. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.4 WATER PIPING, BURIED

- A. Copper Pipe: ASTM B 42, hard drawn, Type K.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.5 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy.
 - 2. Joints: For sizes 1-1/2" and smaller, ASTM B 32, alloy Sn95 solder.

3. Joints: For sizes 2" and larger, AWS A5.8, BCuP5 silver braze.
 - B. Provide full solder cup for all fittings.
 - C. Schedule 40 Screwed Brass: Capped or plugged outlets.
- 2.6 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
- A. PVC Pipe (Solid Wall): ASTM D1784, ASTM D1785, and ASTM D2665
 1. Fittings: PVC
 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- 2.7 STORM WATER PIPING, ABOVE GRADE
- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 1. Fittings: Cast iron.
 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- 2.8 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING
- A. Polyethylene Pipe: ASTM D2513, SDR 11.
 1. Fittings: ASTM D2683 or ASTM D2513 socket type.
 2. Joints: Fusion welded.
- 2.9 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING
- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 1. Fittings: ASTM A234/A234M, wrought steel welding type.
 2. Joints: ASME B31.1, welded.
 3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
- 2.10 NATURAL GAS PIPING, ABOVE GRADE
- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 1. Pipe size 2" and smaller: Malleable iron threaded fittings.
 2. Pipe size 2-1/2" and larger: Steel butt welded fittings.
 3. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 4. Joints: Threaded or welded to ASME B31.1.
- 2.11 FLANGES, UNIONS, AND COUPLINGS
- A. Unions for Pipe Sizes 2 Inches and Under:
 1. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

- B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.12 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Modular/Mechanical Seal:
 - 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 - 2. Provide watertight seal between pipe and wall/casing opening.
 - 3. Elastomer element size and material in accordance with manufacturer's recommendations.
 - 4. Glass reinforced plastic pressure end plates.

2.13 GAS PRESSURE REGULATING VALVES

- A. Provide single stage, steel jacketed, corrosion resistant gas pressure regulating valves with atmospheric vent and elevation compensator sized for inlet and outlet pressures , specific gravity and volume indicated on the drawings.
- B. Compliance requirements:
 - 1. Appliance Regulator: ANSI Z21.18/CSA 6.3.
 - 2. Line Pressure Regulator: ANSI Z21.80/CSA 6.22.
- C. For sizes 2" and smaller: threaded ends.
- D. For sizes 2-1/2" and larger: flanged ends.
- E. Provide high and low pressure cutout and internal relief for each regulator.

2.14 RELIEF VALVES

- A. Temperature and Pressure:
 - 1. ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

2.15 STRAINERS

- A. Size 2 Inches and Under:
 - 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
 - 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. A fusion-bonded epoxy coating system or a suitable tape coating should be applied to all buried steel pipelines in accordance with ANSI/AWWA C214-95, "AWWA Standard for Tape Coating Systems for the Exterior of Steel Water Pipelines." Also, a tape coating per AWWA Standard C209-95 is recommended for special sections, connections and fittings.
- E. Insulating flanges and/or couplings should be installed to electrically isolate the buried portions of steel pipelines from other metallic pipelines, reinforced concrete structures and above grade structures.
- F. A sacrificial type of cathodic protection using magnesium anodes should be installed to protect the buried portions of steel pipelines used for the natural gas piping systems. Cathodic protection should be designed in accordance with NACE Standard SP0169-13 and applicable local standards and included with the contract documents to permit installation along with the subject pipeline.
- G. All buried copper water laterals shall be electrically isolated from metallic water mains via the use of insulating type corporation stops installed at the water main.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
- J. Install valves with stems upright or horizontal, not inverted. See Section 22 05 23.
- K. Install water piping to ASME B31.9.
- L. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- M. Sleeve pipes passing through partitions, walls, and floors.
- N. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9.
 2. Support horizontal piping as indicated.
 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 4. Place hangers within 12 inches of each horizontal elbow.
 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 6. Provide copper plated hangers and supports for copper piping.
 7. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
 8. Support cast iron drainage piping at every joint.
- O. Manufactured Sleeve-Seal Systems:
1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 3. Locate piping in center of sleeve or penetration.
 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 5. Tighten bolting for a watertight seal.
 6. Install in accordance with manufacturer's recommendations.

3.4 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.5 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed, and clean.
- B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.

- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.7 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches to 1-1/4 inches:
 - 1. Maximum Hanger Spacing: 6.5 ft.
 - 2. Hanger Rod Diameter: 3/8 inches.
 - b. Pipe Size: 1-1/2 inches to 2 inches:
 - 1. Maximum Hanger Spacing: 10 ft.
 - 2. Hanger Rod Diameter: 3/8 inch.
 - c. Pipe Size: 2-1/2 inches to 3 inches:
 - 1. Maximum Hanger Spacing: 10 ft.
 - 2. Hanger Rod Diameter: 1/2 inch.
 - d. Pipe Size: 4 inches to 6 inches:
 - 1. Maximum Hanger Spacing: 10 ft.
 - 2. Hanger Rod Diameter: 5/8 inch.

END OF SECTION

SECTION 22 10 06

PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cleanouts.
- B. Backflow preventers.
- C. Double check valve assemblies.
- D. Water hammer arrestors.
- E. Trap primers.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 22 10 05 - Plumbing Piping.

1.3 REFERENCE STANDARDS

- A. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; 2009.
- B. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011.
- C. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- D. NSF 372 - Drinking Water System Components - Lead Content; 2011.
- E. PDI-WH 201 - Water Hammer Arresters; 2010.

1.4 SUBMITTALS

- A. See Section 01 33 00 – Submittals.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Project Record Documents: Record actual locations of equipment, cleanouts, water hammer arrestors.
- E. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.6 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of California plumbing code.
- B. Domestic water piping and components shall be provided and installed in accordance with California AB 1953 Legislation (effective January 1, 2010), which limits the allowable lead content in certain domestic water system components.
- C. Conform to applicable code for installation of backflow prevention devices.
- D. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.2 Refer to Plumbing Schedule for plumbing piping specialties not listed herein.

2.3 DRAINS

- A. Manufacturers:
 - 1. Josam Company: www.josam.com/#sle.
 - 2. Jay R. Smith Manufacturing Company.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.

2.4 CLEANOUTS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company: www.josam.com/#sle.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Cleanouts at Exterior Surfaced Areas:
 - 1. Round cast nickel bronze access frame and non-skid cover.
- C. Cleanouts at Exterior Unsurfaced Areas:
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- D. Cleanouts at Interior Finished Floor Areas :
 - 1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and nickel bronze round gasketed scored cover in service areas and round or

square nickel bronze gasketed depressed cover to accept floor finish in finished floor areas.
Zurn ZN-1400.

- E. Cleanouts at Interior Finished Wall Areas:
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw. Zurn Z-1441 or Z-1443.
- F. Cleanouts in concealed aboveground cast iron soil or waste lines: Zurn Z-1440A with raised head ABS plastic plug.

2.5 BACKFLOW PREVENTERS

- A. Manufacturers:
 - 1. Febco.
 - 2. Watts Regulator Company.
 - 3. Wilkins.
- B. Reduced Pressure Backflow Preventers:
 - 1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.6 DOUBLE CHECK VALVE ASSEMBLIES

- A. Manufacturers:
 - 1. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 - 2. Wilkins.
- B. Double Check Valve Assemblies:
 - 1. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.7 WATER HAMMER ARRESTORS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Zurn Industries, LLC: www.zurn.com/#sle.
 - 3. Sioux Chief.
- B. Water Hammer Arrestors:
 - 1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F, maximum 125 psi working pressure and maximum 250 psi static pressure.

2.8 TRAP PRIMERS

- A. Provide trap primers, 1/2 inch size, where indicated on drawings. Provide with built-in air gap and install 1/2" shutoff valve. PVC housings are not acceptable. Install trap primer line with 1/4" per foot slope to insure full drainage to floor drain or floor sink. Install tap primer behind wall with access door.
- B. Provide a distribution unit with feeder piping for a maximum of four (4) traps where multiple traps are serviced by a single trap primer.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface as indicated on plans. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install cleanouts in all horizontal soil and waste piping at 50 feet maximum spacing inside building, 100 feet maximum spacing outside building, at every change of direction and where shown on Drawings.
- E. Install two way cleanout in building drain (waste line leaving the building) just outside of the building.
- F. Install cleanouts in waste drops from each urinal and sink.
- G. Install cleanouts in rain water (storm drain) drops 18 inches above finished floor. For concealed rainwater drops extend cleanout to building exterior for access.
- H. Install floor cleanouts at elevation to accommodate finished floor.
- I. Pipe relief from backflow preventer to nearest drain.
- J. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to and water closets and as shown on plans.

END OF SECTION

SECTION 22 15 00

GENERAL-SERVICE COMPRESSED-AIR SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe and pipe fittings.
- B. Air compressor.
- C. Air receiver and accessories.
- D. Pressure reducing station.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 22 05 23 - General-Duty Valves for Plumbing Piping.
- C. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- D. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Identification of piping system.
- E. Division 16 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- C. ASME B31.1 - Power Piping; 2014.
- D. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- E. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- F. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.

1.4 SUBMITTALS

- A. See Section 01330 - Submittals, for submittal procedures.
- B. Product Data: Provide manufacturers catalog literature with capacity, weight, and electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate piping system schematic with electrical characteristics and connection requirements.
- D. Operation Data: Submit for air compressor, air receiver, and accessories, aftercooler, refrigerated air dryer, and pressure reducing station.

- E. Maintenance Data: Submit for air compressor, air receiver, and accessories, aftercooler, refrigerated air dryer, and pressure reducing station.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in PCCD's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Pressure Vessels: Comply with applicable code for installation of pressure vessels.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept air compressors, refrigerated air dryer on site in factory-fabricated containers with shipping skids and plastic pipe end protectors in place. Inspect for damage.
- B. Protect piping and equipment from weather and construction traffic.

1.7 WARRANTY

- A. See Section 01 78 36 - Warranties.

PART 2 PRODUCTS

2.1 PIPE AND PIPE FITTINGS

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, solder, Grade Sn95.

2.2 AIR OUTLETS

- A. Quick Connector: 3/8 inch brass, snap-on connector with self closing valve, Style A.
- B. Quick Connector: 1 inch brass, snap-on connector with self closing valve, Style A.

2.3 UNIONS AND COUPLINGS

- A. Unions:
 - 1. Copper Tube and Pipe: 150 psi bronze unions with soldered joints.
- B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- C. Flexible Connector: Neoprene with brass threaded connectors.

2.4 COMPRESSOR

- A. Existing air compressors (one 11kW and one 18kW) are to be owner furnished and contractor installed.
- B. Existing interconnecting piping, valves, controls and related appurtenances from air compressors and receiver tank to be owner furnished and contractor installed.

2.5 AIR RECEIVER

- A. Existing air receiver tank is to be owner furnished and contractor installed.
- B. Existing interconnecting piping, valves, controls and related appurtenances from air compressors and receiver tank to be owner furnished and contractor installed.

2.6 PRESSURE REDUCING VALVE

- A. Pressure Reducing Station: Consisting of automatic reducing valve and bypass, and low pressure side relief valve and gauge. Provide oil separator where indicated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Install compressor unit on concrete housekeeping pad.
- C. Install compressor unit on vibration isolators. Level and bolt in place. Refer to Section 22 05 48.
- D. Make air cock and drain connection on horizontal casing.
- E. Install line size ball valve and check valve on compressor discharge.
- F. Install valved drip connections at low points of piping system. Refer to Section 22 05 23.
- G. Install takeoffs to outlets from top of main, with shut off valve after takeoff. Slope takeoff piping to outlets.
- H. Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.
- I. Identify piping system and components. Refer to Section 22 05 53.

3.2 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Compressed Air Piping Leak Test: Prior to initial operation, clean and test compressed air piping in accordance with ASME B31.1.
- C. Repair or replace compressed air piping as required to eliminate leaks, and retest to demonstrate compliance.

- D. Cap and seal ends of piping when not connected to mechanical equipment.

END OF SECTION

SECTION 22 30 00

PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water Heaters:
 - 1. Commercial gas fired.
- B. In-line circulator pumps.
- C. Cooling condensate removal pumps.
- D. Expansion Tanks.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 01 91 00 Commissioning.

1.3 REFERENCE STANDARDS

- A. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2011.
- B. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous; 2014.
- C. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.
- F. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.

3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide electrical characteristics and connection requirements.
- C. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in PCCD's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.7 WARRANTY

- A. See Section 01700 - Contract Closeout, for additional warranty requirements.
- B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.1 WATER HEATERS

- A. Manufacturers:
 1. A.O. Smith Water Products Co: www.hotwater.com/#sle.
 2. State Water Heaters: www.statewaterheaters.com
- B. Commercial Gas Fired:
 1. Type: Automatic, natural gas-fired condensing type, vertical storage, power-direct vent.
 2. Ultra Low-Nox type complying with SCAQMD Rule 1146.2.
 3. Shall meet thermal efficiency and standby loss requirements of the U.S. Department of Energy and current edition of ASHRAE/IES 90.1.
 4. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches foam plastic, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
 5. Accessories:
 - a. Water Connections: Brass.
 - b. Dip Tube: Brass.
 - c. Drain valve.

- d. Anode: Magnesium.
- e. Temperature and Pressure Relief Valve: ASME labeled.
- f. Acid Neutralizer Kit
- g. Concentric Vent Kit

2.2 IN-LINE CIRCULATOR PUMPS

- A. Manufacturers:
 - 1. Armstrong Fluid Technology: www.armstrongfluidtechnology.com/#sle.
 - 2. Bell & Gossett, a xylem brand: www.bellgossett.com/#sle.
 - 3. Taco, Inc: www.tacomfort.com/#sle.
- B. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.
- C. Impeller: Bronze.
- D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- E. Seal: Carbon rotating against a stationary ceramic seat.

2.3 COOLING CONDENSATE REMOVAL PUMPS

- A. Manufacturers:
 - 1. Liberty Pumps Inc: www.libertypumps.com/#sle.
 - 2. Little Giant Pumps: www.littlegiant.com
 - 3. Blue Diamond Pumps Inc: www.bluediamondpumps.com
- B. Construction: Commercial grade, nonferrous pump with stainless steel shaft, integral discharge check valve, integral float switch, safety switch, thermoplastic reservoir, motor assembly, and power cord with ground.
- C. Safety: UL 778.

2.4 EXPANSION TANK

- A. Manufacturers:
 - 1. Amtrol Inc: www.amtrol.com/#sle.
 - 2. Bell & Gossett, a xylem brand: www.bellgossett.com/#sle.
 - 3. Taco, Inc: www.tacomfort.com/#sle.
- B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 38 psig.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Coordinate with plumbing piping and related fuel piping, gas venting, and electrical work to achieve operating system.
- C. Provide and install CPVC piping for combustion air intake and flue for gas fired water heaters where scheduled and as shown on the drawings. Install in accordance with manufacturer's installation instructions.
- D. Pumps:
 - 1. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.
 - 2. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and over.
 - 3. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water closets.
- B. Urinals.
- C. Lavatories.
- D. Sinks.
- E. Service sinks.
- F. Drinking fountains.
- G. Bottle filling stations.
- H. Emergency showers.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 22 10 05 - Plumbing Piping.
- C. Section 22 10 06 - Plumbing Piping Specialties.

1.3 REFERENCE STANDARDS

- A. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008.
- B. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2002).
- C. ASME A112.18.1 - Plumbing Supply Fittings; 2012.
- D. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2013.
- E. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2011.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- H. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.4 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.

- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in PCCD's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.6 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of California plumbing code.
- B. Domestic water piping and components shall be provided and installed in accordance with California AB 1953 Legislation (effective January 1, 2010), which limits the allowable lead content in certain domestic water system components.
- C. Conform to applicable code for installation of backflow prevention devices.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.8 WARRANTY

- A. See Section 01700 - Contract Closeout, for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 GENERAL REQUIREMENTS:

- A. Refer to Architectural drawings for exact locations, fixture mounting heights and ADA accessibility requirements.
- B. Insulate domestic hot water, tempered water and waste piping below handicapped plumbing fixtures with molded single piece removable insulation covers, foam, fire resistant, Truebro, or equal. Install insulation covers in accordance with ADA requirements.
- C. Provide 85% IPS red brass pipe for each connection to faucets, stops, hose bibs, and other fixtures/trim. Securely anchor brass pipe to structure. Install stop valves on water supply lines for each fixture, except hose bibbs.

- D. Provide compression shutoff control stop valves with IPS inlets and threaded brass nipples at pipe connection on water supplies to each fixture. Provide stops with lock shield loose key and key handle for each stop. For combination fixtures, provide with compression stop and IPS inlet on each water supply fitting.
- E. Provide cast brass escutcheons, except escutcheons exposed to view shall have chrome plated finish.
- F. Provide chromium-plated finish on fittings and accessories exposed to view.
- G. Fixture fittings and trim: Conform to ASME A112.18.1M and ASME A112.19.5, as applicable.
- H. Centerset faucets: Top-mounted with inlets on not greater than 4 inch centers, unless specified otherwise below.
- I. Separate faucets and combination supply fittings: Provide inlets on 8 inch centers.
- J. Zinc-alloy or plastic handles are not permitted for faucets and valves.
- K. Provide special roughing-in for wheelchair fixtures.
- L. Provide 0.35 GPM flow restrictor for all public lavatories.
- M. Water closet flush flow rates not to exceed 1.28 GPF.
- N. Urinal flush flow rates not to exceed 0.125 GPF.
- O. Provide water hammer arrestors at end of pipe runs to two or more fixtures, properly sized with sufficient displacement volume to dissipate calculated energy in the piping systems. Water hammer arrestors shall be stainless steel shell with stainless steel bellows contained within the casing, Zurn Model Z-1700, or equal. See Section 15146. Locate in accessible location or provide access panel with location approved by Architect.
- P. Fixture dimensions specified are nominal.

2.3 SEE PLUMBING FIXTURE SCHEDULE FOR FIXTURE REQUIREMENTS.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.4 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.5 CLEANING

- A. Clean plumbing fixtures and equipment.

END OF SECTION

SECTION 23 05 10

MECHANICAL GENERAL PROVISIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. References.
- B. Description of Work.
- C. Drawings and Specifications.
- D. Industry Standards and Codes.
- E. Site Examination.
- F. Permits, Fees and Utility Connections.
- G. Coordination of Work.
- H. Progress of Work.
- I. Submittals
- J. Operation and Maintenance Manuals.
- K. Project Record Documents.
- L. Warranty.
- M. Quality and Care
- N. Access Doors.
- O. Starting Equipment and Systems.

1.2 RELATED SECTIONS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
- C. The requirements of this Section apply to all Work of Division 23.
- D. Section 01 33 00 - Submittals.
- E. Section 01 77 00 – Contract Closeout.

1.3 REFERENCES

- A. ANSI - American National Standards Institute.
- B. ASTM - American Society for Testing Materials.

- C. CEC - California Electric Code.
- D. NEC - National Electric Code.
- E. NEMA - National Electric Manufacturers' Association.
- F. NFPA - National Fire Protection Association.
- G. OSHA - Occupational Safety and Health Act.
- H. UL - Underwriters' Laboratories.
- I. See detailed References that are listed in individual sections.

1.4 DESCRIPTION OF WORK

- A. The work included in this division of the specifications consists of furnishing labor, tools, equipment, supplies and materials, unless otherwise specified, and in performing operations necessary for the installation of the complete Mechanical System as required by these specifications or shown on the Drawings, subject to the terms and conditions of the Contract Agreement.
- B. The work shall also include the completion of details of mechanical work not mentioned or shown which are necessary for the successful operation of mechanical systems described on the drawings or required by these specifications. Furnish and install any incidental work not shown or specified which is required to provide a complete and operational system.

1.5 DRAWINGS AND SPECIFICATIONS

- A. Drawings are schematic and diagrammatic. Drawings indicate the general arrangement of equipment, piping, ductwork and other mechanical work. Use judgement and care to install mechanical work to fit the job conditions within the building construction and finishes, and to function properly.
- B. The Contractor shall investigate the building conditions affecting the Work and shall arrange his work accordingly providing offsets, fittings, valves and accessories to fit the actual job conditions. The Contractor shall be responsible to field measure and confirm new and existing mechanical systems locations with respect to other architectural, structural, and electrical work, existing and new. Do not scale distances off of the mechanical drawings. Use actual building dimensions.
- C. The drawings and specifications are complimentary each to the other. What is required by one shall be as binding as if called for by both.
- D. Examine all drawings and specifications prior to bidding the Work. Report any discrepancies to the Engineer.

1.6 INDUSTRY STANDARDS AND CODES

- A. The Mechanical Contractor shall comply with the latest provisions of all codes, regulations, laws and ordinances applicable to the work involved. This does not relieve the Contractor from furnishing and installing work shown or specified which may exceed the requirements of such codes, regulations laws and ordinances.
- B. All materials, products, devices, fixtures forms or types of construction included in this project shall meet or exceed the published requirements of the publications listed below. These publications form a part of this specification.

1. California Building Code, 2019.
 2. California Mechanical Code, 2019.
 3. California Plumbing Code, 2019.
 4. California Electrical Code, 2019.
 5. National Fire Protection Association.
 6. California Fire Code, 2019.
 7. California State Fire Marshal.
 8. Occupational Safety and Health Administration, including CAL-OSHA.
 9. California Energy Code, 2019.
 10. California Green Building Standards Code, 2019.
 11. State of California Code of Regulations, Title 24.
 12. Other applicable state laws.
- C. Nothing in the Drawings or Specifications shall be construed to permit work that does not conform these codes. When Contract Documents differ from governing codes, furnish and install to the higher standard required at no extra charge. The Contract Documents are not intended to repeat the code requirements except where necessary for clarity.
- D. No material or product installed as a part of the Work shall contain asbestos in any form.

1.7 SITE EXAMINATION

- A. Contractor shall examine the site, verify dimensions and locations with Drawings, check utility connection locations, and familiarize himself with the existing conditions and limitations. No extras will be allowed because of the Contractor's misunderstanding of the amount of work involved or his lack of knowledge of any site condition which may affect his work. Any apparent variance of the drawings or specifications from the existing conditions at the site shall be called to the attention of the Engineer immediately.

1.8 PERMITS, FEES AND UTILITY SERVICES

- A. Contractor shall pay for and obtain all permits and service required in the installation of this work.
- B. Contractor shall arrange for all required inspections and will secure approvals from authorities having jurisdiction.

1.9 COORDINATION OF WORK

- A. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work and that such establishment is the exclusive responsibility of the contractor.
- B. The Contractor shall give careful consideration to the work of the General, Electrical and other contractors on the job and shall organize his work so that it will not interfere with the work of other trades. He shall consult the drawings and specifications for work of other trades for correcting information, and the pertinent drawings for details and dimensions.

- C. Arrange mechanical work in a neat, well-organized manner with the piping, conduit, and similar services running parallel and/or perpendicular to primary lines of the building construction. Locate operating and control equipment properly to provide easy access, and arrange entire mechanical work with adequate access for operation and maintenance.
- D. Verify the location of all equipment, and devices, etc. and if interference develops, the Owner/Engineer's decision will be final and no additional compensation will be allowed for the moving of misplaced air devices or equipment.

1.10 PROGRESS OF WORK

- A. This Contractor shall organize his work so that the progress of the mechanical work will conform to the progress of the other trades, and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from defective or ill timed work performed under this section shall be borne by this Contractor.

1.11 STRUCTURAL DESIGN REQUIREMENTS AND SEISMIC RESTRAINTS

- A. Mechanical systems and equipment shall be anchored and seismically braced in accordance with all applicable codes and industry standards.
- B. Mechanical systems and equipment shall include, but are not limited to, all piping, heating and ventilating equipment, electrical and control panels, conduits and other components.
- C. Supports, anchorage and restraints, including attachments to building structure, for all piping and ductwork for standard installation details that comply with the latest edition of the Mason Industries "Seismic Restraint Guidelines", or equal, shall be used wherever possible. The Contractor shall provide all supporting documentation required for the Engineer and the reviewing authorities. If compliance with one of these standards is demonstrated, separate structural calculations are not required.

1.12 SUBMITTALS

- A. See Section 013300 - Submittal Procedures, for additional submittal procedures.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project.
- D. Organize submittals in sequence according to Specification Section. Submit in bound document with tabs identifying each Specification Section. Provide a Table of Contents identifying the Specifications Sections being submitted and the contents within each tabbed section. Prepare Submittals in multiple volumes if required. Provide a complete Submittal package at one time. Do not submit individual Sections piecemeal.
- E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- F. Furnish, upon request, installation instructions for all equipment and materials to Inspector of Record prior to installation.
- G. Maintain a copy of the fire and smoke damper installation instructions on site for use by the Inspector of Record.

1.13 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. LP Consulting Engineers, Inc. will consider requests for substitutions only within 7 days after date of Agreement.
- C. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- D. Failure by the Contractor to order materials or equipment in a timely manner will not constitute justification for a substitution.
- E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- F. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to PCCD.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse PCCD and LP Consulting Engineers, Inc. for review or redesign services associated with reapproval by authorities including obtaining reapproval by authorities.
- G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- H. If excessive review, as judged by the Engineer, is required caused by complicated, numerous or repetitive requests, Contractor shall reimburse Engineer and its Consultants for such review at their standard billing rates.
- I. Substitution Submittal Procedure:
 - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. The LP Consulting Engineers, Inc. will notify Contractor in writing of decision to accept or reject request.
 - 4. Present each substitution individually. If a proposed substitute is not found to be acceptable, then the specified item shall be supplied.

1.14 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01700 Closeout Submittals for Operation and Maintenance Manual requirements.

- B. Provide operating and maintenance instructions, diagrams and parts lists for all components of all mechanical systems and each piece of equipment furnished under these specifications.
- C. Operating and maintenance instructions shall be furnished for the following equipment and systems:
 - 1. Ventilating Systems.
 - 2. Air Conditioning Systems.
 - 3. Piping Systems.
 - 4. Temperature Controls Systems.
 - 5. Motors.
 - 6. Testing, Adjusting, and Balancing Reports.
- D. Provide manufacturer's model number, design data, capacities, etc. for each piece of mechanical equipment furnished as a part of the Work.
- E. The operating instructions shall include procedures for starting, stopping and emergency manual operation for all equipment and systems.
- F. Provide maintenance instructions of each item of individual equipment including applicable maintenance data as recommended by the manufacturer, including frequency of lubrication, lubricants, inspections required, adjustment procedures, belt and pulley sizes, etc.
- G. Provide manufacturer's parts bulletins with part numbers for each item of equipment included in the Work. Parts bulletins shall be specific to the equipment provided. Extraneous information that does not apply to the equipment provided shall be eliminated from the literature.
- H. Include copies of test reports (startup, check, etc.) and inspections performed for each piece of equipment provided in the Work.
- I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in PCCD's name and registered with manufacturer.
- J. Provide supplier and manufacturer contacts, telephone numbers and addresses in the front portion of the operation and maintenance manual.

1.15 PROJECT RECORD DOCUMENTS

- A. See Section 017700 - Closeout Procedures.
- B. Provide red-lined drawings accurately showing location of equipment and devices and size and routing of ductwork. Include notes explaining installed condition for complete understanding.

1.16 QUALITY ASSURANCE

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from LP Consulting Engineers, Inc. before proceeding.

- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

1.17 PROJECT CONDITIONS

- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.18 WARRANTY

- A. See Section 01 78 36 - Warranties.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 QUALITY AND CARE

- A. All materials shall be new and in perfect condition when installed unless specifically indicated otherwise. Materials shall be tested within the Continental United States by an independent, nationally recognized testing agency and shall be listed in accordance with testing agency requirements. When not otherwise specified, all material shall conform to applicable National Standards (ANSI).
- B. All capacities, sizes and efficiency ratings shown on the drawing are minimum.
- C. Each category of material or equipment shall be of the same brand or manufacturer throughout the Work wherever possible.
- D. The quality of materials and equipment to be provided is defined by the brand names, manufacturers, model and catalog numbers listed on the Drawings and in the Specifications. Contractor shall provide each item listed, of the quality specified, or equal.
- E. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable Installation and Maintenance Manuals.
- F. Inspect and report concealed damage to carrier within their required time period.
- G. Store materials in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or heavy plastic cover to protect from dirt, water, construction debris, and traffic.
- H. Equipment which has been damaged, exposed to weather or is, in the opinion of the Engineer or Owner, otherwise unsuitable because of improper fabrication, storage or installation shall be removed and replaced by this Contractor at his expense.

2.2 ACCESS DOORS

- A. Coordinate access door requirements with Section 083113. The more stringent requirements shall govern.
- B. Provide access doors where access through floors, walls or ceilings is required to access mechanical, plumbing, control system components, fire dampers and fire alarm system components (such as smoke detectors, fire/smoke dampers, etc.) or other systems requiring access for maintenance, test or observation.
 - 1. Access doors requiring hand access or access for observation only shall be 14"x14" minimum usable opening.
 - 2. Access doors where entrance of a service person may be required shall be 24"x30" minimum usable opening.
- C. Established standard: Milcor of types listed below. Other acceptable manufacturers: Cesco, J.L. Industries, Karp, Larsen's, or equal. Comply with the following:
 - 1. Form doors and frames of welded, ground smooth steel construction, 14 gauge for doors, 16 gauge for frames. Provide prime coat finish except for stainless steel type.
 - 2. Concealed hinges to allow 175 degree opening.
 - 3. Locks: flush, screw driver operated cam lock(s).
 - 4. Provide anchoring devices suitable for the construction into which the doors are framed.
- D. Application (as applicable):
 - 1. In gypsum drywall walls and ceilings: Type DW.
 - 2. In ceramic tile walls: Type MS (stainless steel).
 - 3. In fire rated walls: Type Fire Rated (rating as required for wall or ceiling), self closing, 250 F in 30 min. temperature rating.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Access Doors
 - 1. Coordinate the exact location of access doors to provide proper access to the item concealed. Obtain written approval for access door locations from Architect.
 - 2. Coordinate installation of access doors with the trades performing the construction assemblies into which the access doors are placed.
 - 3. Install all access doors neatly and securely, to open and close completely, and to operate freely and without binding. Install rated doors in accordance with their listing requirements.
 - 4. Test operate all doors and make all adjustments required for satisfactory operation. Replace all damaged materials.
 - 5. Install in accordance with manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with the requirements within this section.
- B. Test all piping with no leak or loss in pressure in accordance with the requirements within this section.

3.3 GENERAL TESTING REQUIREMENTS FOR MECHANICAL AND PLUMBING SYSTEMS

- A. Contractor shall assign a responsible person to be an independent representative to witness testing and to sign as witness of times, pressure and losses of testing media for all hydronic piping and duct testing.
 - 1. Test all piping as noted below with no leak or loss of pressure. Repair or replace defective piping until tests are accomplished successfully.
 - 2. Submit to the Engineer for review a log of all tests made which shall include time, temperature, pressure, water makeup and other applicable readings, necessary to indicate the systems have been operated and tested in the manner outlined in the construction documents.
 - 3. After producing the specified test pressure, disconnect the pressurizing source; do not introduce further pressure for the duration of the test period, repair leaky piping and retest. Repeat the procedure until the entire system is proven tight.
- B. Test the following systems with the medium listed to the pressure indicated for the time period listed:
 - 1. Hydronic Piping: Pressure=125 Psig / Medium= Water / Duration=4 Hours.

3.4 CUTTING AND PATCHING

- A. Submit written request in advance of cutting or alteration which affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of PCCD or separate Contractor.
- B. Execute cutting and patching to complete the work, to uncover work to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.
- C. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- E. Restore work with new Products in accordance with requirements of Contract Documents.

- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Code requirements , to full thickness of the penetrated element.
- H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.5 PRIMING AND PAINTING

- A. Apply primer to all exposed ferrous metals that are not factory primed, factory finished, galvanized, stainless steel or anodized. Exposed black steel piping shall be primed and finish painted to match Architectural finish requirements.
 - 1. Primer shall be as recommended by the paint manufacturer for each specific application.
 - 2. Acceptable Products include: Fuller O'Brien Blox-Rust Metal All Purpose Primer, equivalent Rust-Oleum product, or equal. See Section 092216 for other acceptable products.
- B. Apply two coats of primer to metal surfaces of items to be insulated or jacketed, except ductwork and piping, or factory primed or finished.
- C. Preparation:
 - 1. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
 - 2. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; seal stains and marks which cannot be completely removed using Devoe KILSTAIN primers, shellac, or other coating acceptable to paint manufacturer any marks or defects that might bleed through paint finishes.
 - 3. Remove mildew from impervious surfaces by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow substrate to thoroughly dry.
 - 4. Galvanized Surfaces:
 - a. Remove surface contamination and oils by solvent cleaning in accordance with SSPC-SP 1 and allow to dry.
 - b. Apply Devoe MIRROLAC Galvanized Metal Primer in accordance with manufacturer instructions.
 - 5. Uncoated Steel And Iron Surfaces:
 - a. Remove grease, rust, scale, and dust from steel and iron surfaces using solvent in accordance with SSPC-SP 1.
 - b. Where heavy coatings of scale or contaminants are evident, hand tool clean in accordance with SSPC-SP 2 or use other approved SSPC SP method as needed.
 - 6. Shop Primed Steel Surfaces: Remove loose primer and dust. Sand and feather edges to smooth surface. Clean areas with solvent and spot prime bare metal surfaces with appropriate Devoe MIRROLAC metal primer or primer recommended by manufacturer.
- D. Application:

1. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.
2. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
3. Remove dust and other foreign materials from substrate immediately prior to applying each coat.

E. Finish Painting: See Section 09900.

3.6 STARTING EQUIPMENT AND SYSTEMS/COMMISSIONING

- A. Start equipment and systems in accordance with manufacturer's written instructions..
- B. Adjust for proper operation within manufacturer's published tolerances.
- C. Demonstrate proper operation of equipment to PCCD's designated representative.
- D. Description:
 1. Comply with all start up of mechanical and electrical equipment systems as required in the various sections and herein.
 2. Coordinate all testing and startup procedures with all other trades so that all non-mechanical and non-electrical work is completed and operational so that the specified testing can be performed.
- E. Preliminary Work:
 1. Prior to the startup, the Contractor shall ensure that the systems are ready to operate, and the following items have been completed and checked including but not limited to:
 - a. Proper motor and pump rotation.
 - b. Flushing and cleaning of the system.
 - c. Wiring
 - d. Auxiliary connections
 - e. Lubrication.
 - f. Venting.
 - g. Controls.
 - h. Installation of filters and strainers.
 - i. Setting of relief and safety valves .
 2. All electrical testing must be completed and test results submitted before equipment startup to avoid power interruptions during mechanical equipment startup and testing.
 3. The Contractor shall submit at least 10 days in advance a schedule listing the date of completion of his work as it will be ready for equipment startup of Electrical/Mechanical equipment. This schedule shall include work on a system by system, floor by floor basis.

4. Two weeks prior to the startup of any major equipment, the Contractor shall certify in writing that the systems will be complete and ready for startup. Completeness shall not only include physical installation of individual pieces of equipment, but all related elements of other crafts to make all equipment operate as a system.
 - a. The startup checklist will cover all related crafts, e.g., controls, electrical, mechanical, and a clean environment for equipment startup.
 5. The Contractor shall schedule a tour with the Owner's representative and the Engineer to review startup conditions prior to equipment startup. This tour shall take place during the associated Engineer's regularly scheduled visit. This tour does not relieve the Contractor of any responsibilities to properly start equipment. The Engineer will issue a notice of deficiencies that will be required to be corrected prior to equipment startup. The Contractor will be required to reschedule a back check with the Engineer prior to attempting an equipment startup.
 6. Equipment of systems should not be started until systems and associated subsystems are completed. Verify that other continuing work could not possibly damage completed systems if they are in operation. Furnish signed off prestartup check sheet.
- F. Startup and Commissioning:
1. System Startup and Operation:
 - a. The Contractor shall provide all labor, materials and services necessary for the initial startup and operation of all systems and equipment furnished and installed under this section.
 - b. The Contractor and the factory representative shall check all equipment during initial startup to insure correct rotation, proper lubrication, adequate fluids or air flows, nonoverloading electrical characteristics, proper alignment and vibration isolation. Systems shall be checked for air and/or water flows throughout without blockages. Air handling systems shall be checked for proper damper connections and positions, aligned and adjusted belt drives, proper lubrication, temporary air filters installed, nonexcessive electrical characteristics and minimal vibration. Other miscellaneous equipment shall be started and operated as described above as applicable. Manufacturer's representative shall submit a preliminary written copy of equipment startup check sheet prior to leaving job site.
 - c. After initial startup and operation of systems, the Contractor shall submit a report, showing proper operation before commencement of the final "Operation Test".
 - d. During initial operation of the system and until substantial completion, qualified personnel shall be provided and designated for maintaining the equipment and systems in good running order. Items such as strainers, cleanouts, filter replacement, bearing lubrication, packing replacement, and other consumables shall be provided without cost to the Owner. Failure of equipment during this period due to lack of proper supervision is the responsibility of the Contractor and continued failures shall be grounds for the Owner to provide such services with back charges to the Contractor. Submit written schedule of completed maintenance to the Engineer.
- G. System Acceptance:
1. General: The system installation shall be complete and tested for proper operation prior to acceptance testing "Operation Test" for the Owners authorized representative. A letter shall

be submitted to the Engineer requesting system acceptance. This letter shall certify that all controls are installed and the software programs have been completely exercised for proper equipment operation. Acceptance testing shall commence at a mutually agreeable time within ten (10) calendar days of request. When the field test procedures have been demonstrated to the Owner's representative and pass, the system will be accepted. The warranty period may begin at this time.

H. Operation Test:

1. Provide all labor, equipment, and materials required to perform test.
2. The test shall occur after all major equipment startup and balance services have been performed as specified. The purpose is to demonstrate that individual pieces of equipment and all related elements operate as one complete system and not to identify incomplete or defective work.
3. All equipment is to be run in an automatic operating position and exercised for 72 hours to verify that they perform in accordance with the specified sequence of operation and designed operation logic.
4. The Engineer's representative shall be notified and may be present for the initiation of the test.
5. A log shall be prepared by the Contractor, to be submitted to the Engineer, of all tests including, but not limited to: time, temperatures, pressures, and other readings to prove all equipment is operating as specified.
6. All temperatures, pressures, status indication, etc., shall be verified by at least one other means of measurement or visual verification of condition.
7. Change set points and simulate conditions as directed to demonstrate:
 - a. Ability to control to new set point.
 - b. Interface between systems, fire alarm/fire sprinkler systems.
 - c. Proper sequence and operation.
 - d. Equipment safety systems and all automatic changeover/backup systems and alarms are functioning or will function.
8. If unsatisfactory performance or a system failure is experienced for any reason, the test shall be repeated until 72 hour consecutive hours are achieved. The Engineer's representative shall make all final decisions of a satisfactory test.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other HVAC/hydraulic work.

1.2 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2013.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- I. MFMA-4 - Metal Framing Standards Publication; 2004.
- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- K. NFPA 101 - Life Safety Code; 2015.
- L. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Submittals.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Comply with MSS SP-58.
2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems:

1. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
 - b. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
3. Comply with MFMA-4.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 1 inch (27 mm) nominal: 3/8 inch diameter.
 - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

D. Thermal Insulated Pipe Supports:

1. General Construction and Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.

- c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
- d. Insulation inserts to consist of calcium silicate insulation surrounded by a 360 degree, PVC jacketing.
- 2. PVC Jacket:
 - a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
 - b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
 - c. Thickness: 60 mil.
- E. Pipe Supports:
 - 1. Liquid Temperatures Up To 122 degrees F:
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
 - 2. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
 - b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
 - c. Sliding Support: MSS SP-58 Types 35 through 38.
- F. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
 - 1. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
 - 2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- G. Riser Clamps:
 - 1. Provide copper plated clamps for copper tubing support.
 - 2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
- H. Offset Pipe Clamps: Double-leg design two-piece pipe clamp.
- I. Strut Clamps: Two-piece pipe clamp.
- J. Insulation Clamps: Two bolt-type clamps designed for installation under insulation.
- K. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
 - 1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 - 2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- L. Pipe Alignment Guides: Galvanized steel.
 - 1. Pipe Diameter 8 inches and Smaller: Spider or sleeve type.
 - 2. Pipe Diameter 10 inches and Larger: Roller type.

- M. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- N. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
 2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 3. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 4. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- O. Pipe Shields for Insulated Piping:
1. General Construction and Requirements:
 - a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
 - b. Shields Material: UV-resistant polypropylene with glass fill.
 - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
 - d. Minimum Service Temperature: Minus 40 degrees F.
 - e. Maximum Service Temperature: 178 degrees F.
 - f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- P. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by LP Consulting Engineers, Inc., do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by LP Consulting Engineers, Inc., do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer and DSA.

- F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Ceiling tacks.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

1.3 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.4 SUBMITTALS

- A. See Section 013300 - Submittal Procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Air Terminal Units: Nameplates.
- C. Control Panels: Nameplates.
- D. Dampers: Ceiling tacks, where located above lay-in ceiling.
- E. Heat Transfer Equipment: Nameplates.
- F. Major Control Components: Nameplates.
- G. Piping: Pipe markers.

- H. Pumps: Nameplates.
- I. Small-sized Equipment: Tags.
- J. Tanks: Nameplates.
- K. Thermostats: Nameplates.
- L. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.2 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Seton Identification Products: www.seton.com/aec.

2.3 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: Air Handling Units, Control panels: 1 inch.
 - 3. Letter Height: All others: 1/4 inch.
 - 4. Background Color: Black.
 - 5. Plastic: Comply with ASTM D709.

2.4 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.5 PIPE MARKERS

- A. Color: Comply with ASME A13.1.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Secure to pipe using two (2) bands of adhesive tape with flow arrows supplied by the manufacturer. Install securing bands completely around pipe and overlapped.
- C. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.6 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.
- B. Color code as follows:
 - 1. Fire Dampers and Smoke Dampers: Red.
 - 2. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- D. Identify fans and filter boxes with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- E. Identify chilled/hot water equipment, including chillers, boilers, pumps, expansion tanks, air separators, etc. with plastic nameplates.
- F. Identify air conditioning units, air handling units, heating and ventilating units, exhaust fans, pumps, heat transfer equipment, tanks, fire/smoke damper access doors, and water treatment devices with nameplates. Small devices, such as terminal units, in-line pumps, may be identified with tags.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify thermostats/sensors relating to fan unit and/or zone unit with nameplates.
- I. Identify valves in main and branch piping with tags.
- J. Identify piping, concealed or exposed, with plastic pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

1.3 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.4 SUBMITTALS

- A. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component and include controls contractor to assist in testing, adjusting, and balancing procedures. Submit plan for each phase.
 - 1. Submit to LP Consulting Engineers, Inc..
 - 2. Submit four prior to starting the testing, adjusting, and balancing work.
 - 3. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the LP Consulting Engineers, Inc. and other installers to sufficiently understand the design intent for each system.
 - 4. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. List of all air flow measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.

- d. Identification and types of measurement instruments to be used and their most recent calibration date.
 - e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - f. Final test report forms to be used.
 - g. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1. SA, RA, EA, OA, for each AHU.
 - 2. Economizer proportioning and vfd speed adjustments.
 - 3. Rechecking.
 - h. Expected problems and solutions, etc.
 - i. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - j. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - k. Method of checking building static and exhaust fan and/or relief damper capacity.
 - l. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - m. Procedures for formal progress reports, including scope and frequency.
 - n. Procedures for formal deficiency reports, including scope, frequency and distribution.
- B. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit to LP Consulting Engineers, Inc. within 2 days after completion of testing, adjusting, and balancing.
 - 2. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 3. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 4. Units of Measure: Report data in I-P (inch-pound) units only.
 - 5. Test Reports: Indicate data on AABC MN-1 forms, forms prepared following ASHRAE Std 111, or NEBB forms.
 - 6. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.

- f. Project Engineer.
 - g. Project altitude.
 - h. Report date.
- C. Test and balance shall be performed by an independent test and balance agency.
- D. Perform total system balance in accordance with AABC MN-1, ASHRAE Std 111, or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- E. TAB Agency Qualifications: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three years documented experience certified by AABC or NEBB.
- F. Perform Work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor experienced in performance of this Work and licensed at the California.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
- 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. SMACNA (TAB).
- B. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- C. TAB Agency Qualifications:
- 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Having minimum of three years documented experience.
 - 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.2 TESTING, ADJUSTING, AND BALANCING AGENCIES

- A. RS Analysis, 916-358-5673.
- B. Raglen System Balance.

3.3 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.4 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to LP Consulting Engineers, Inc. to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

3.5 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 5 percent of design for return and exhaust systems.

3.6 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by PCCD.

3.7 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- E. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- F. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- G. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

3.8 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Air Handling Units.
 - 2. Fans.
 - 3. Air Filters.
 - 4. Air Inlets and Outlets.

3.9 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
 - 6. Service factor.
 - 7. Starter size, rating, heater elements.
 - 8. Sheave Make/Size/Bore.
- B. Cooling Coils:
 - 1. Location.
 - 2. Service.
 - 3. Manufacturer.
 - 4. Air flow, design and actual.
 - 5. Entering air DB temperature, design and actual.
 - 6. Entering air WB temperature, design and actual.

7. Leaving air DB temperature, design and actual.
 8. Leaving air WB temperature, design and actual.
 9. Saturated suction temperature, design and actual.
 10. Air pressure drop, design and actual.
- C. Air Moving Equipment:
1. Location.
 2. Manufacturer.
 3. Model number.
 4. Serial number.
 5. Arrangement/Class/Discharge.
 6. Air flow, specified and actual.
 7. Return air flow, specified and actual.
 8. Outside air flow, specified and actual.
 9. Total static pressure (total external), specified and actual.
 10. Inlet pressure.
 11. Discharge pressure.
 12. Sheave Make/Size/Bore.
 13. Number of Belts/Make/Size.
 14. Fan RPM.
- D. Return Air/Outside Air/Exhaust Air:
1. Identification/location.
 2. Design air flow (determined by initial test)
 3. Actual air flow.
 4. Design return air flow (determined by initial test)
 5. Actual return air flow.
 6. Design outside air flow (determined by initial test)
 7. Actual outside air flow.
 8. Return air temperature.
 9. Outside air temperature.
 10. Actual mixed air temperature.
- E. Duct Traverses:
1. System zone/branch.
 2. Duct size.

3. Area.
4. Design velocity.
5. Design air flow.
6. Test velocity.
7. Test air flow.
8. Duct static pressure.
9. Air temperature.
10. Air correction factor.

END OF SECTION

SECTION 23 07 13

DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.
- C. Insulation jackets.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 23 31 00 - HVAC Ducts and Casings: Ductwork.

1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- F. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 RELATED SECTIONS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.

- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
- C. The requirements of this Section apply to all Work of Division 23.
- D. Section 013300 - Submittals.

1.5 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. Owens-Corning Fiberglas; Model [All Service Faced Duct Wrap].
 - 2. Knauf Insulation: www.knaufinsulation.com.
 - 3. Johns Manville: www.jm.com/#sle.

- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Duct Application: 2" thick, 3/4 pound density.
 - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.3 GLASS FIBER, RIGID

- A. Manufacturer:
 - 1. Knauf Insulation: www.knaufinsulation.com.
 - 2. Johns Manville: www.jm.com/#sle.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent.
 - 4. Density: 3.0 lb/cu ft.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.4 JACKETS

- A. Aluminum Jacket: ASTM B209 (ASTM B209M).
 - 1. Thickness: 0.020 inch sheet.
 - 2. Finish: Embossed.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.5 DUCT LINER

A. Manufacturers:

1. Knauf Insulation: www.knaufinsulation.com.
2. Johns Manville: www.jm.com/#sle.
3. Owens Corning Corp: www.owenscorning.com.

B. Insulation: Incombustible glass fiber complying with ASTM C 1071; flexible blanket; impregnated surface and edges coated with acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21.

1. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
2. Duct Application (Indoors): 1" thick, 1-1/2 pound density.
3. Duct Application (Outdoors): 2" thick, 1-1/2 pound density.
4. Service Temperature: Up to 250 degrees F.
5. Acoustical Requirements
 - a. Sound absorption coefficients of the material (with and/or without erosion resistive coating) shall be greater than or equal to the coefficients listed in the specifications when tested under the specified conditions.
 - b. All acoustical measurements shall be performed in accordance with ANSI/ASTM C423 and shall be performed in the ASTM E795 mounting configuration as indicated.
 - c. An independent acoustical laboratory shall perform the tests.
 - d. The sound absorption coefficient provided by the material shall meet or exceed the following values in each octave band listed:
6. Thickness, 1 inch Hz/Coefficient: 125/.05, 250/.20, 500/.65, 1k/.90, 2k/.95, 4k/.95.

C. Liner Fasteners: Galvanized steel, welded with integral head.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Insulated Ducts Conveying Air Below Ambient Temperature:
 1. Provide insulation with vapor barrier jackets.
 2. Finish with tape and vapor barrier jacket.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.

4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated Ducts Conveying Air Above Ambient Temperature:
1. Provide with or with standard vapor barrier jacket.
 2. Finish with tape and vapor barrier jacket.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 100 percent coverage.
 2. Secure insulation with mechanical liner fasteners. Liner shall start within 3 inches of the upstream transverse edges of the liner and 3 inches from the longitudinal joints, and shall be spaced at a maximum of 12 inches on center around the perimeter of the duct (except that they shall be a maximum of 12 inches from a corner break). Elsewhere, they shall be a maximum of 18 inches on center, except that they shall not be placed more than 6 inches from a longitudinal joint of the liner or 12 inches from a corner break. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible for spacing.
 3. Seal and smooth joints. Seal and coat transverse and longitudinal joints.
 4. Seal liner surface penetrations with adhesive.
 5. Duct dimensions indicated are inside dimensions and do not include consideration for liner thickness.

3.3 SCHEDULES

- A. Supply and Return Ducts: Insulate all unlined supply ducts, except ducts exposed in conditioned spaces.
- B. Exterior Applications:
1. Supply and Return Ducts exposed to outdoors to be internally lined except ductwork conveying direct evaporatively cooled air.
 2. Supply and Return ductwork exposed to outdoors for direct evaporatively cooling systems to be externally insulated. Cover insulation with with calked aluminum jacket with seams located on bottom side of horizontal duct section.
- C. Supply and Return Ducts: Install lining on ductwork and plenums where shown or noted on drawings.

END OF SECTION

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 07 84 13 – Penetration Firestopping.
- C. Section 23 23 00 - Refrigerant Piping: Placement of inserts.

1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- D. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010.
- E. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 13300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, RIGID

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. Knauf Insulation: www.knaufusa.com.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. "K" value: ASTM C 177:
 - a. 0.24 to 0.28 at 100 degrees mean rating temperature.
 - b. 0.25 to 0.29 at 125 degrees mean rating temperature.
 - c. 0.27 to 0.30 at 150 degrees mean rating temperature.
 - d. 0.29 to 0.31 at 200 degrees mean rating temperature.
 - e. 0.32 to 0.34 at 250 degrees mean rating temperature.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Vapor Barrier Lap Adhesive: Compatible with insulation.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Armacell LLC; ArmaFlex Ultra with FlameDefense: www.armacell.us/#sle.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.4 JACKETS

- A. PVC Plastic.
 - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Embossed.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Inserts and Shields:

1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert material: Pipe saddle.
- C. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 84 00.

3.3 SCHEDULE

A. Cooling Systems:

1. Refrigerant Piping:
 - a. Flexible Elastic Cellular Insulation:
 1. Pipe Size Range: 1 inch and smaller.
 - 1.01. Thickness: 1 inch.
 2. Pipe Size Range: 1.25 inch and larger.
 - 2.01. Thickness: 1.5 inch.

END OF SECTION

SECTION 23 08 00

MECHANICAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The purpose of this section is to specify the Contractor's responsibilities and participation in the commissioning process relative to division 23.
- B. The commissioning process is primarily the responsibility of the Commissioning Authority, with support for start-up, testing, and commissioning the responsibility of the Contractors. The commissioning process does not relieve the Contractor from participation in the process or diminish the role and obligations to complete all portions of work in a satisfactory and fully operational manner.
- C. Work of Division 23 includes:
 - 1. Testing and start-up of the mechanical equipment.
 - 2. Assistance in functional testing to verify equipment/ system performance.
 - 3. Providing qualified personnel to assist in commissioning tests, including seasonal testing.
 - 4. Completion and endorsement of pre-functional test checklists provided by the Commissioning Authority to assure that Division 23 equipment and systems are fully operational and ready for functional testing.
 - 5. Providing equipment, materials, and labor necessary to correct deficiencies found during the commissioning process which fulfill contract and warranty requirements.
 - 6. Providing training for the systems specified in Division 23 with coordination of owner.

1.2 RELATED WORK

- A. All testing and start-up procedures and documentation requirements specified within Division 23.
- B. Section 01 9100 – General Commissioning Requirements
- C. Section 26 0800 – Electrical Commissioning Requirements
- D. Section 22 08 00 - Plumbing Commissioning Requirements
- E. Commissioning functional test procedures that require participation of the Contractors.
- F. Cooperate with the Commissioning Authority in the following manner:
 - 1. Allow sufficient time before final completion dates so that test and balance and commissioning testing can be accomplished.
 - 2. Provide labor and material to make corrections when required without undue delay.
 - 3. Put all heating, ventilating, and air conditioning systems and equipment into full operation and continue the operation of the same during each working day of commissioning.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Standard certified test equipment for commissioning shall be provided by the TAB Contractor.
- B. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Commissioning Authority in the commissioning process.

PART 3 - EXECUTION

3.1 WORK PRIOR TO COMMISSIONING

- A. Complete all phases of work so the system can be started, tested, balanced, and otherwise commissioned. Division 23 has primary start-up responsibilities with obligations to complete systems, including all sub-systems so they are functional. This includes the complete installation of all equipment, materials, pipe, duct, wire, insulation, controls, etc., per the contract documents and related directives, clarifications, change orders, etc.
- B. The Commissioning Authority will develop a Commissioning Plan. Upon request of the Commissioning Authority, the Contractor shall provide assistance and consultation. The Commissioning Plan will be developed prior to completion of the installation. The Contractor is obligated to assist the Commissioning Authority in preparing the Commissioning Plan by providing all necessary information pertaining to the actual equipment and installation.
- C. Specific pre-commissioning responsibilities of Division 23 are as follows:
 - 1. Normal start-up services required to bring each system into a fully operational state. This includes motor rotational check, cleaning, filling, purging, control sequences of operation, leak testing, full-load and part-load performance, etc. The Commissioning Authority will not begin the commissioning process until each system is complete and documented, including normal contractor start-up.
 - 2. The Contractor shall perform pre-functional tests on the equipment and systems as noted in section 01 9100 General Commissioning Requirements.
 - 3. Contractor start-up forms may be substituted for the pre-functional test forms with prior approval by the Commissioning Authority.
 - 4. Pre-functional test forms will be kept in the Contractors job trailer in a Commissioning Field Notebook provided by the Commissioning Authority.
 - 5. Factory start-up services will be provided for key equipment and systems specified in Division 23. The Contractor shall coordinate this work with the manufacturer and the Commissioning Authority.
 - 6. Functional testing is intended to begin upon completion of a system. Commissioning may proceed prior to the completion of systems and/or sub-systems, if expediting this work is in the best interests of the Owner. Commissioning activities and schedule will be coordinated with the Contractor. Start of commissioning before system completion will not relieve the Contractor from completing those systems as per the schedule.
- D. The Field Commissioning Notebook will be used to identify and track all pertinent commissioning documentation required during the Installation phase. This Notebook will be

assembled by the Commissioning Authority and maintained by the Contractor. The Notebook provides a central location for the Commissioning Authority to identify, copy and organize all pertinent information and will include the following format:

1. Summary describing Notebook contents and use.
2. Copy of Commissioning Plan for contractor field reference.
3. Listing of all specification documentation requirements listed by specification section, with sign off spots for appropriate contractors.
4. Tabs for each specification section with copies of pre-functional test check sheets provided by coordination of subcontractors and Commissioning Authority for contractor completion and space for related contractor-supplied documents.
5. Prior to functional testing the Commissioning Authority will use this book to verify that all appropriate contractors have completed their work and signed off that they have done so. Once the Commissioning Authority is satisfied that all components of a system are complete functional testing will begin.

3.2 PARTICIPATION IN COMMISSIONING

- A. Provide skilled technicians to start up and debug all systems within the division of work. These same technicians shall be made available to assist the Commissioning Authority in completing the commissioning program as it relates to each system and their technical specialty. Work schedules, time required for testing, etc., will be requested by the Commissioning Authority and coordinated by the Contractor. Contractor will ensure the qualified technician(s) are available and present during the agreed-upon schedules and of sufficient duration to complete the necessary tests, adjustments, and/or problem resolutions.
- B. The Commissioning Authority reserves the right to judge the appropriateness and qualifications of the technicians relative to each item of equipment, system, and/or sub-system. Qualifications of technicians include expert knowledge relative to the specific equipment involved, adequate documentation and tools to service/commission the equipment, and an attitude/willingness to work with the Commissioning Authority to get the job done. A liaison or intermediary between the Commissioning Authority and qualified factory representatives does not constitute the availability of a qualified technician for purposes of this work.

3.3 WORK TO RESOLVE DEFICIENCIES

- A. Maladjustments, misapplied equipment, and/or deficient performance under varying loads will result in a system that does not meet the original design intent. Correction of work will be completed under the direction of the Architect, with input from the Contractor, equipment supplier, and Commissioning Authority. Whereas all members will have input and the opportunity to discuss, debate, and work out problems, the Architect/Engineer of Record will have final jurisdiction on the necessary work to be done to achieve performance and or design intent.

3.4 ADDITIONAL COMMISSIONING

- A. Additional commissioning activities may be required after system adjustments, replacements, etc., are completed. The Contractor, suppliers, and Commissioning Authority shall include a reasonable reserve to complete this work as part of their standard contractual obligations.

3.5 SEASONAL COMMISSIONING AND OCCUPANCY VARIATIONS

- A. Seasonal commissioning pertains to testing under full-load conditions during peak heating and peak cooling seasons, as well as part-load conditions in the spring and fall. Initial commissioning will be done as soon as contract work is completed regardless of season. Subsequent commissioning may be undertaken at any time thereafter to ascertain adequate performance during the different seasons.
- B. All equipment and systems will be tested and commissioned in a peak season to observe full-load performance. Heating equipment will be tested during winter design extremes. Cooling equipment will be tested during summer design extremes, with a fully occupied building. The Contractor will be responsible to participate in the initial and the alternate peak season test of the systems required to demonstrate performance.
- C. Subsequent commissioning may be required under conditions of minimum and/or maximum occupancy or use. All equipment and systems affected by occupancy variations will be tested and commissioned at the minimum and peak loads to observe system performance. The Contractor will be responsible to participate in the occupancy sensitive testing of systems to provide verification of adequate performance.

3.6 TRAINING

- A. The Contractor will be required to participate in the training of the Owner's engineering and maintenance staff for each mechanical system and the related components. Training may be conducted in a classroom setting, with system and component documentation, and suitable classroom training aids, or in the field with the specific equipment. The type of training will be per the Owner's option.
- B. Training will be conducted jointly with the equipment vendors, the Contractor and Owner's operations and maintenance representatives. The Contractor will be responsible for the generic training, as well as instructing the Owner's staff on the system peculiarities specific to this project.

3.7 SYSTEMS DOCUMENTATION

- A. Contract Documents to incorporate field changes and revisions to system designs to account for actual constructed configurations will be addressed as required in Division 1. All drawings should be red-lined on two sets. Division 23 as-built drawings should include updated architectural floor plans, and the individual mechanical systems in relation to actual building layout.
 - 1. Maintain as-built red-lines on the job site as required in Division 1.
 - 2. In addition to the stated requirements for operation and maintenance data, provide one copy of equipment technical literature, operation and maintenance literature, and shop drawings to the Commissioning Authority as soon as they are available. This requirement is for review of these documents prior to distribution of multiple copies for the Owner's final use.

END OF SECTION

SECTION 23 09 24

DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. System Description
- B. System Performance
- C. Materials
- D. Communication
- E. Operator Workstation
- F. Controllers.
- G. Power Supplies and Line Filtering
- H. Wiring and Raceways
- I. Programming

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

1.3 REFERENCE STANDARDS

- A. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks; 2012.
- B. FCC Regulation, Part 15- Governing Frequency Electromagnetic Interference
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Submittals.
- B. Product Data and Shop Drawings: Contractor shall provide shop drawings or other submittals on all hardware, software, and installation to be provided. No work may begin on any segment of this project until submittals have been reviewed and approved for conformity with the design intent. Six copies are required. All drawings shall be done in DXF format and provided on magnetic/optical disk and as full-size Mylar drawings. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is to cover.

General catalogs shall not be accepted as cut sheets to fulfill submittal requirements. Submittals shall be provided within 12 weeks of contract award. Submittals shall include:

1. Direct Digital Control System Hardware:
 - a. A complete bill of materials of equipment to be used shall be listed indicating quantity, manufacturer, model number, and other relevant technical data.
 - b. Manufacturer's description and technical data, such as performance curves, product specification sheets, and installation/maintenance instructions for the items listed below and other relevant items not listed below:
 1. Direct Digital Controller (controller panels)
 2. Transducers/Transmitters
 3. Sensors (including accuracy data)
 4. Actuators
 5. Valves
 6. Relays/Switches
 7. Control Panels
 8. Power Supply
 9. Batteries
 10. Operator Interface Equipment
 11. Wiring
 - c. Wiring diagrams and layouts for each control panel. Show all termination numbers
 - d. Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware
2. Central System Hardware and Software
 - a. A complete bill of material of equipment used indicating quantity, manufacturer, model number, and other relevant technical data.
 - b. Manufacturer's description and technical data, such as product specification sheets and installation/maintenance instructions for the items listed below and other relevant items not listed below:
 1. Central Processing Unit
 2. Monitors
 3. Printers
 4. Keyboard
 5. Power Supply
 6. Battery Backup
 7. Interface Equipment Between CPU and Control Panels
 8. Operating System Software

9. Operator Interface Software
 10. Color Graphic Software
 11. Third-party Software
- c. A schematic diagram for all control wiring, communication wiring and power wiring shall be provided. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers, function and data link protocol(s). Show all interface wiring to the control system
 - d. Provide detailed riser diagrams of wiring between central control unit, operator workstation(s), routers, gateways and all control panels
 - e. A list of the color graphic screens shall be provided. For each screen, provide a conceptual layout of pictures and data, and show or explain which other screens can be directly accessed
3. Controlled Systems:
 - a. A schematic diagram of each controlled system. The schematics shall have all control points/objects labeled and with point/object names shown or listed. The schematics shall graphically show the location of all control elements in the system
 - b. A schematic wiring diagram for each controlled system. Each schematic shall have all elements labeled. Where a control element is the same as that shown on the control system schematic, it shall be labeled with the same name. All terminals shall be labeled
 - c. An instrumentation list for each controlled system. Each element of the controlled system shall be listed in table format. The table shall show element name, type of device, manufacturer, model number, and product data sheet number
 - d. A mounting, wiring, and routing plan view drawing. The drawing shall be done in ¼" scale. The design shall take into account HVAC, electrical and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work
 - e. A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system
 - f. A point/object list for each system controller including both inputs and outputs (I/O), point/object number, the controlled device associated with the I/O point/object, and the location of the I/O device. Software flag points/objects, alarm points/objects, etc
 4. Quantities of items submitted shall be reviewed, but are the responsibility of the Contractor
 5. A description of the proposed process along with all report formats and checklists to be used in Part 3: "Control System Demonstration and Acceptance."
 6. A BACnet Protocol Implementation Conformance Statement (PICS) for each type of controller and operator interface included in the submittal. PICS to include for each product, as a minimum, a list of BACnet functional groups supported, BACnet services supported, BACnet data link options available and BACnet objects provided

C. Schedules:

1. Within one month of contract award, provide a schedule of the work indicating the following
 - a. Intended sequence of work items
 - b. Start dates of individual work items.
 - c. Duration of individual work items
 - d. Planned delivery dates for major material and equipment, and expected lead times
 - e. Milestones indicating possible restraints on work by other trades or situations.
2. Provide monthly written status reports indicating work completed, revisions to expected delivery dates, etc. An updated project schedule shall be included.

D. Project Record Documents: Upon completion of installation, submit three copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and shall include:

1. Project Record Drawings. These shall be as-built versions of the submittal shop drawings. One set of magnetic media including DXF drawing files also shall be provided
2. Testing and Commissioning Reports and Checklists. Completed versions of all reports and checklists, along with all trend logs, used to meet the requirements of Part 3: "Control System Demonstration and Acceptance."
3. Certification of the pressure test required in Part 3: "Control Air Tubing."
4. Operation and Maintenance (O & M) Manual. This shall include as-built versions of the submittal product data. In addition to the information required for submittals, the O & M manual shall include:
 - a. Names, addresses, and 24-hour telephone numbers of Contractors installing equipment, and the control systems and service representatives of each
 - b. Operators Manual with procedures for operating the control systems, including logging on/off, alarm handling, producing point/object reports, trending data, overriding computer control, and changing setpoints and other variables
 - c. One set of Programming Manuals with a description of the programming language (including syntax), statement descriptions (including algorithms and calculations used), point/object database creation and modification, program creation and modification, and use of the editor
 - d. Engineering, Installation, and Maintenance Manual(s) that explain how to design and install new points/objects, panels, and other hardware; preventive maintenance and calibration procedures; how to debug hardware problems; and how to repair or replace hardware
 - e. A listing and documentation of all custom software created using the programming language, including the setpoints, tuning parameters, and object database. One set of magnetic/optical media containing files of the software and database also shall be provided

- f. One set of magnetic/optical media containing files of all color graphic screens created for the project
 - g. A list of recommended spare parts with part numbers and suppliers
 - h. Complete original issue documentation, installation, and maintenance information for all third-party hardware provided, including computer equipment and sensors
 - i. Complete original issue diskettes for all software provided, including operating systems, programming language, operator workstation software, and graphics software
 - j. Licenses, guarantee, and warranty documents for all equipment and systems
 - k. Recommended preventive maintenance procedures for all system components, including a schedule of tasks (inspection, cleaning, calibration, etc.), time between tasks, and task descriptions
- E. Manuals: The Contractor shall provide manuals for all equipment provided.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
 - 1. All products used in this installation shall be new, currently under manufacture, and shall be applied in standard off the shelf products. This installation shall not be used as a test site for any new products unless explicitly approved by the Engineer in writing. Spare parts shall be available for at least 5 years after completion of this contract.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.
 - 1. The Installer shall have an established working relationship with the Control System Manufacturer.
 - 2. The Installer shall have successfully completed Control System Manufacturer's classes on the control system. The Installer shall present for review the certification of completed training, including the hours of instruction and course outlines upon request.
- D. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

1.6 WARRANTY

- A. See Section 01700 - Contract Closeout, for additional warranty requirements.
- B. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- C. Labor and materials for the control system specified shall be warranted free from defects for a period of 12 months after final completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during normal business hours.

- D. All work shall have a single warranty date, even when the Owner has received beneficial use due to an early system start-up. If the work specified is split into multiple contracts or a multi-phase contract, then each contract or phase shall have a separate warranty start date and period
- E. At the end of the final start-up, testing, and commissioning phase, if equipment and systems are operating satisfactorily to the Engineer, the Engineer shall sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this specification. The date of acceptance shall be the start of warranty.
- F. Operator workstation software, project-specific software, graphic software, database software, and firmware updates which resolve known software deficiencies as identified by the Contractor shall be provided at no charge during the warranty period. Any upgrades or functional enhancements associated with the above mentioned items also can be provided during the warranty period for an additional charge to the Owner by purchasing an in-warranty service agreement from the Contractor. Written authorization by the Owner must, however, be granted prior to the installation of any of the above mentioned items.
- G. Exception: The Contractor shall not be required to warrant reused devices, except for those that have been rebuilt and/or repaired. The Contractor shall warrant all installation labor and materials, however, and shall demonstrate that all reused devices are in operable condition at the time of Engineer's acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Delta Controls by ESI

2.2 SYSTEM DESCRIPTION

- A. General: The control system shall be as shown and consist of a high-speed, peer-to-peer network of DDC controllers and an operator workstation residing and communicating on a BACnet internet work. Each mechanical system, building floor plan, and control device will be depicted by point-and-click graphics. A modem shall be provided for remote access to the network. Systems using gateways to route proprietary devices and objects to BACnet are not acceptable.
- B. The control system shall be supplied with a complete web enabled package. The system shall support unlimited users using standard web browsers such as Chrome or Firefox. The web server software shall operate on standard industry PC servers. Proprietary servers or "black boxes" are not acceptable. Web browser software shall be manufactured by the control system manufacturer and shall have the same look and feel as the operating system. Third party web software is not acceptable.
- C. The system will provide for future expansion to include monitoring of the card access, fire alarm, and lighting control systems.
- D. The Contractor shall use only products from the corresponding manufacturer and product line listed.
- E. The system shall connect to the existing Delta Controls Orcaview System. New graphics shall be created at this server. The system shall be installed in to match the County standards

including installation methods, graphic screens, programming, alarms, and historical trending to match the existing Delta Control System installed by Environmental Systems, Inc.

- F. The above list of manufacturers applies to operator workstation software, controller software, the custom application programming language, Building Controllers, Custom Application Controllers, and Application Specific Controllers. All other products specified herein (e.g., sensors, valves, dampers, and actuators) need not be manufactured by the above manufacturers.
- G. All products used in this project installation shall be new, currently under manufacture, and shall be applied in similar installations for a minimum of two years. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's Representative in writing. Spare parts shall be available for at least five years after completion of this contract.

2.3 SYSTEM PERFORMANCE

- A. Performance Standards. The system shall conform to the following:
 - 1. Graphic Display. The system shall display a graphic with 20 dynamic points/objects with all current data within 10 seconds.
 - 2. Graphic Refresh. The system shall update a graphic with 20 dynamic points/objects with all current data within 8 seconds
 - 3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be less than 2 seconds. Analog objects should start to adjust within 2 seconds
 - 4. Object Scan. All changes of state and change of analog values will be transmitted over the high-speed Ethernet network such that any data used or displayed at a controller or workstation will have been current within the previous 2 seconds
 - 5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 45 seconds
 - 6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 1 second. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control
 - 7. Performance. Programmable controllers shall be able to execute DDC PID control loops at a frequency of at least once per second. The controller shall scan and update the process value and output generated by this calculation at this same frequency
 - 8. Multiple Alarm Annunciations. All workstations on the network must receive alarms within 5 seconds of each other
 - 9. Reporting Accuracy. The system shall report all values with an end-to-end accuracy as listed or better than those listed in Table 1
 - 10. Stability of Control. Control loops shall maintain measured variable at setpoint within the tolerances listed in Table 2

2.4 OWNERSHIP OF PROPRIETARY MATERIAL

- A. All project-developed software and documentation shall become the property of the Owner. These include, but are not limited to:

1. Project graphic images
2. Record drawings
3. Project database
4. Project-specific application programming code
5. All documentation

2.5 COMMUNICATION

- A. All control products provided for this project shall comprise a BACnet internetwork. Communication involving control components (i.e., all types of controllers and Operator Workstations) shall conform to ANSI/ASHRAE Standard 135-2001, BACnet.
- B. Each BACnet device shall operate on the BACnet Data Link/Physical layer protocol specified for that device as defined in this section.
- C. The Contractor shall provide all communication media, connectors, repeaters, bridges, hubs, switches, and routers necessary for the internetwork.
- D. All controllers shall have a communication port for connections with the Operator Workstations using the BACnet Data Link/ Physical layer protocol.
- E. Communication services over the internetwork shall result in operator interface and value passing that is transparent to the internetwork architecture as follows:
 1. Connection of an Operator Workstation device to any one controller on the internetwork will allow the operator to interface with all other controllers as if that interface were directly connected to the other controllers. Data, status information, reports, system software, custom programs, etc., for all controllers shall be available for viewing and editing from any one controller on the internetwork.
 2. All database values (e.g., objects, software variables, custom program variables) of any one controller shall be readable by any other controller on the internetwork. This value passing shall be automatically performed by a controller when a reference to an object name not located in that controller is entered into the controller's database. An operator/installer shall not be required to set up any communication services to perform internetwork value passing.
- F. The time clocks in all controllers shall be automatically synchronized daily. An operator change to the time clock in any controller shall be automatically broadcast to all controllers on the network.
- G. The network shall have the following minimum capacity for future expansion:
 1. Each Building Controller shall have routing capacity for 99 controllers.
 2. The Building Controller network shall have capacity for 1000 Building Controllers.
 3. The system shall have an overall capacity for 12,500 Building Controller, Advanced Application Controller, and Application Specific Controller input/output objects.

2.6 OPERATOR WORKSTATION

- A. Operator Workstation: Not needed, interface with Existing PC-based system.

- B. System Graphics. The existing operator workstation software shall be expanded to include new graphics to match the remodeled systems.

2.7 CONTROLLER SOFTWARE

- A. Furnish the following applications software for building and energy management. All software applications shall reside and operate in the system controllers. Editing of applications shall occur at the operator workstation
- B. System Security
 - 1. User access shall be secured using individual security passwords and user names.
 - 2. Passwords shall restrict the user to the objects, applications, and system functions as assigned by the system manager.
 - 3. User Log On/Log Off attempts shall be recorded.
- C. Scheduling. Provide the capability to schedule each object or group of objects in the system. Each schedule shall consist of the following:
 - 1. Weekly Schedule. Provide separate schedules for each day of the week. Each of these schedules should include the capability for start, stop and optimal start. Each schedule may consist of up to 10 events. When a group of objects are scheduled together, provide the capability to adjust the start and stop times for each member.
 - 2. Holiday Schedules. Provide the capability for the operator to define up to 99 special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.
- D. Alarm Reporting. The operator shall be able to determine the action to be taken in the event of an alarm. Alarms shall be routed to the appropriate workstations based on time and other conditions.
- E. Sequencing. Provide application software to properly sequence the start and stop of chillers, boilers, and pumps to minimize energy usage in the facility.
- F. PID Control. A PID (proportional-integral-derivative) algorithm with direct or reverse action and anti-windup shall be supplied. The algorithm shall calculate a time-varying analog value that is used to position an output or stage a series of outputs. The controlled variable, setpoint, and PID gains shall be user-selectable.
- G. Staggered Start. This application shall prevent all controlled equipment from simultaneously restarting after a power outage.
- H. Energy Calculations. Provide software to allow instantaneous power (e.g., kW) or flow rates (e.g., L/s [GPM]) to be accumulated and converted to energy usage data. Provide an algorithm that calculates a sliding-window kW demand value.
- I. Anti-Short Cycling. All binary output objects shall be protected from short cycling. This feature shall allow minimum on-time and off-time to be selected.
- J. On/Off Control with Differential. Provide an algorithm that allows a binary output to be cycled based on a controlled variable and setpoint. The algorithm shall be direct-acting or reverse-acting, and incorporate an adjustable differential.

- K. Run-time Totalization. Provide software to totalize run-times for all binary input objects. A high run-time alarm shall be assigned, if required, by the operator.

2.8 BUILDING CONTROLLERS

- A. General. Provide an adequate number of Building Controllers to achieve the performance specified in the Part 1 Article on "System Performance." Each of these panels shall meet the following requirements.
 - 1. The Energy Management and Control System shall be comprised of one or more independent, standalone, microprocessor-based Building Controllers to manage the global strategies described in the System Software section.
 - 2. The Building Controller shall have sufficient memory to support its operating system, database, and programming requirements.
 - 3. Data shall be shared between networked Building Controllers.
 - 4. The operating system of the Building Controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms.
 - 5. Controllers that perform scheduling shall have a real-time clock.
 - 6. The Building Controller shall communicate with other BACnet objects on the internetwork using the Read (Execute and Initiate) and Write (Execute and Initiate) Property services as defined in Clauses 15.5 and 15.8, respectively, of ASHRAE Standard 135-2001.
 - 7. BACnet Functional Groups. The Building Controller shall support the following BACnet functional groups: Clock, Event Initiation, COV Event Response, Files, Device Communication and Time Master.
- B. Communication
 - 1. Each Building Controller shall support BACnet™ over Ethernet and BACnet™ over IP. The Building Controller shall be connected to the BACnet network using the ISO 8802-3 (Ethernet) Data Link/ Physical layer protocol.
 - 2. Each Building Controller with a communications card shall perform BACnet routing if connected to a network of Custom Application and Application Specific Controllers.
 - 3. The controller shall provide a service communication port using BACnet Data Link/ Physical layer protocol P-T-P for connection to a hand-held workstation/ and/or modem.
 - 4. The Building Controller secondary communication network shall support BACnet MS/TP.
- C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
 - 1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 0°C to 40°C [32°F to 100°F] and 10 to 90% RH.
 - 2. Controllers used in conditioned space shall be mounted in dust?proof enclosures and shall be rated for operation at 0°C to 50°C [32°F to 120°F].
- D. Building Controllers shall be fully peer to peer.

- E. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field- removable, modular terminal strips — or to a termination card connected by a ribbon cable.
- F. Memory. The Building Controller shall have as a minimum standard SRAM of 256 KB, standard DRAM of 1MB and standard non-volatile 1 MB of flash memory in lieu of EPROM. Memory shall be user extendible through RAM chip sockets and SIMMs for future memory expansion.
- G. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. The Building Controller shall maintain all database information including BIOS and programming information in the event of a power loss for at least 72 hours. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m [3 ft].
- H. Inputs/Outputs.
 - 1. Inputs. Controller input/output board shall support dry contact, 0-5 VDC and 0-10 VDC-voltage, 4-20 mA- current and thermistor-resistive signal types on an individual basis for connecting any status or sensing device. Analog resolution shall be 10-bit A to D.
 - 2. Outputs. Controller input/output board shall support built in HOA modules configured with manual-auto-off override switch. Output supported shall be 0-10 VDC. All HOA's shall be supervised.
 - 3. Diagnostics. Controller input/output board shall have red LEDs providing input status indication.
 - 4. Building Controller shall have the capability to create, delete and support the following BACnet Objects:
 - a. ANALOG INPUT, ANALOG OUTPUT AND ANALOG VALUE: These objects shall have the following writeable properties: Object Name; Object Value; Description; COV Increment; Out of Service and Units. In addition, these objects shall support the properties: Device type; Reliability; Min./Max. Values; Update Interval and Resolution.
 - b. BINARY INPUT, BINARY OUTPUT AND BINARY VALUE: These objects shall have the following writeable properties: Object Name; Object Value; Description; Polarity; Default Value; Min On/Off and Out of Service. In addition, these objects shall support the properties: Device Type; Reliability; Active/Inactive Texts; Update Interval; Resolution; Change-of-State Time; Count Times and Time Reset.
 - c. CALENDAR: This object shall have the following writeable properties: Object Name; Object Value; Description; and Date List.
 - d. DEVICE: This object shall have the following writeable properties: Object Name; Description; Location; and UTC Offset.
 - e. EVENT ENROLMENT: This object shall have the following writeable properties: Object Name; Object Value; Description; Out-of-Service; Event & Notify Types; Parameters; Property Ref; Enable; and Notification Class.
 - f. FILE: This object shall have the following writeable properties: Object Name; Description; File Type; and File Access.

- g. LOOP (PID): This object shall have the following writeable properties: Object Name; Object Value; Description; Polarity; Output and Input Refs.; Input Value & Units; Setpoint Value; PID Values; Bias; Write Priority and COV Increment. In addition, this object shall support the properties: Reliability; Update Interval; Proportional Constant & Units; Derviative Constant & Units.
- h. NOTIFICATION CLASS: This object shall have the following writeable properties: Object Name; Object Value; Description; Priority and Ack Required.
- i. PROGRAM: This object shall have the following writeable properties: Object Name; Object Value and Description. In addition, this object shall support the property Reliability.
- j. SCHEDULE: This object shall have the following writeable properties: Object Name; Object Value and Description; Effective period; Schedule; Exception; Controlled Properties and Write Properties.
- k. TREND LOG: This object shall have the following writeable properties: Object Name; Description; Log Enable; Start/stop Times; Log Device Object Property; Log Interval; Stop When Full; Buffer Size; and Record Count.

2.9 ADVANCED APPLICATION CONTROLLERS

- A. General. Provide an adequate number of Programmable Application Controllers to achieve the performance specified in the Part 1 Article on "System Performance." Each of these panels shall meet the following requirements.
 - 1. The Advanced Application Controller shall have sufficient memory to support its operating system, database, and programming requirements.
 - 2. Advanced Application Controllers shall be fully peer to peer.
 - 3. The operating system of the Controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information, and allow central monitoring and alarms.
 - 4. All equipment that requires scheduling shall be scheduled in that equipments controller.
 - 5. Both firmware and controller database shall be loadable over the network.
 - 6. Advanced Application Controllers shall support the following BACnet Interoperability Building Blocks (BIBBs):
- B. Communication.
 - 1. Each Advanced Application Controller shall reside on a BACnet network using the MS/TP or Ethernet Data Link/ Physical layer protocol.
 - 2. The controller shall provide a service communication port using BACnet Data Link/ Physical layer protocol for connection to portable operators' workstation and allow access to the entire network.
- C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
 - 1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at 0°C to 40°C [32°F to 100°F].

2. Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].
- D. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips — or to a termination card connected by a ribbon cable.
- E. Memory. The Advanced Application Controller shall be non-volatile FLASH memory.
- F. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

2.10 APPLICATION SPECIFIC CONTROLLERS

- A. General. Application Specific Controllers (ASCs) are microprocessor-based DDC controllers which through hardware or firmware design are able to control a wide variety of equipment. They are fully user-programmable, and are not restricted to any one type of equipment.
 1. Each ASC shall be capable of standalone operation and shall continue to provide control functions without being connected to the network
 2. Each ASC will contain sufficient I/O capacity to control the target system.
 3. Both firmware and controller database shall be loadable over the network
 4. Application Specific Controllers shall be fully peer to peer
 5. ASC's shall come with an integrated housing to allow for easy mounting and protection of the circuit board. Only wiring terminals shall be exposed.
 6. Application Specific Controllers shall support the following BACnet Interoperability Building Blocks (BIBBs):
- B. Communication
 1. The controller shall reside on a BACnet network using the MS/TP Data Link/ Physical layer protocol.
 2. Each controller shall have a BACnet Data Link/ Physical layer compatible connection for a laptop computer or a portable operator's tool. This connection shall be extended to a space temperature sensor port where shown and allow access to the entire network.
 3. Each controller shall have a secondary sub network for communicating sensors or I/O expansion modules
- C. Environment. The hardware shall be suitable for the anticipated ambient conditions.
 1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at -40°C to 65°C [-40°F to 150°F] and/or suitably installed in a heated or fan cooled enclosure
 2. Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C [32°F to 120°F].
- D. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips.

- E. Memory. The Application Specific Controller shall use non-volatile memory and maintain all BIOS and programming information in the event of a power loss.
- F. Immunity to power and noise. ASC shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80%. Operation shall be protected against electrical noise of 5-120 Hz and from keyed radios up to 5 W at 1 m [3 ft].
- G. Transformer. Power supply for the ASC must be rated at minimum of 125% of ASC power consumption and shall be fused or current limiting type.
- H. Input/Output. ASC shall support as a minimum, directly connected, a combination of analog outputs and binary outputs and universal software selectable analog or digital inputs. ASC inputs shall support 0-5 VDC-voltage, 4-20mA-current, thermistor-resistance and dry contacts. ASC outputs shall support 0-10 VDC-voltage, digital triac rated at 0.5 amps at 24 VAC
- I. System Object Capacity. The system size shall be expandable to at least twice the number of input/output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The Operator Workstations installed for this project shall not require any hardware additions or software revisions in order to expand the system.

2.11 AUXILIARY CONTROL DEVICES

- A. Existing auxiliary control devices, wiring, and panels may be utilized when possible.
- B. Motorized control dampers, unless otherwise specified else-where, shall be furnished by the controls contractor.
- C. Electric damper/valve actuators.
 - 1. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
 - 2. Where shown, for power-failure/safety applications, an internal mechanical, spring-return mechanism shall be built into the actuator housing.
 - 3. All non-spring-return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring-return actuators with more than 7 N·m [60 in-lb] torque capacity shall have a manual crank for this purpose.
- D. Control valves.
 - 1. Control valves shall be two-way or three-way type for two-position or modulating service as shown.
 - 2. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
 - a. Water Valves:
 - 1. Two-way: 150% of total system (pump) head.
 - 2. Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
 - b. Steam Valves: 150% of operating (inlet) pressure.
 - 3. Water Valves:

- a. Body and trim style and materials shall be per manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
- 4. Steam Valves:
 - a. Body and trim materials shall be per manufacturer's recommendations for design conditions and service. Linear ports for modulating service.
- E. Binary Temperature Devices
 - 1. Low-limit thermostats. Low-limit thermostats shall be vapor pressure type with an element 6 m [20 ft] minimum length. Element shall respond to the lowest temperature sensed by any 30 cm [1 ft] section. The low-limit thermostat shall be manual reset only and be supplied as DPST.
- F. Temperature sensors.
 - 1. Temperature sensors shall be thermistors.
 - 2. Space sensors shall be equipped with the following:
 - a. programmable buttons for setpoint adjustment and override
 - b. 3-value, 96-segment LCD display
 - 3. Provide matched temperature sensors for differential temperature measurement.
- G. Humidity sensors.
 - 1. Duct and room sensors shall have a sensing range of 20% to 80%.
 - 2. Duct sensors shall be provided with a sampling chamber.
 - 3. Outdoor air humidity sensors shall have a sensing range of 20% to 95% RH. They shall be suitable for ambient conditions of -40°C to 75°C [-40°F to 170°F].
 - 4. Humidity sensor's drift shall not exceed 3% of full scale per year.
- H. Flow switches.
 - 1. Flow-proving switches shall be either paddle or differential pressure type, as shown.
- I. Local control panels
 - 1. All indoor control cabinets shall be fully enclosed NEMA 1 construction with [hinged door], key-lock latch, and removable sub-panels. A single key shall be common to all field panels and sub-panels
 - 2. Interconnections between internal and face-mounted devices pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL Listed for 600 volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings

2.12 WIRING AND RACEWAYS

- A. General: Provide copper wiring, plenum cable, and raceways in accordance to local code.
- B. Existing wiring and raceways may be reused where possible.

- C. All insulated wire to be copper conductors, UL labeled for 90C minimum service.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started
- C. The Contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the Engineer for resolution before rough-in work is started
- D. The Contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate — or if any discrepancies occur between the plans and the Contractor's work, and the plans and the work of others — the Contractor shall report these discrepancies to the Engineer and shall obtain written instructions for any changes necessary to accommodate the Contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the Contractor to report such discrepancies shall be made by — and at the expense of — this Contractor.

3.2 PROTECTION

- A. The Contractor shall protect all work and material from damage by its work or employees, and shall be liable for all damage thus caused
- B. The Contractor shall be responsible for its work and equipment until finally inspected, tested, and accepted. The Contractor shall protect any material that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects

3.3 COORDINATION

- A. Site
 - 1. Where the mechanical work will be installed in close proximity to, or will interfere with work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If the Contractor installs its work before coordinating with other trades, so as to cause any interference with work of other trades.
 - 2. Coordinate and schedule work with all other work in the same area, or with work which is dependent upon other work, to facilitate mutual progress.

3.4 GENERAL WORKMANSHIP

- A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e., horizontal, vertical, and parallel to walls) wherever possible.
- B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment
- C. Install all equipment in readily accessible locations as defined by Chapter 1, Article 100, Part A of the National Electrical Code (NEC).

- D. All wiring shall be verified for its integrity to ensure continuity and freedom from shorts and grounds
- E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.5 FIELD QUALITY CONTROL

- A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this specification
- B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship
- C. Contractor shall have work inspected by local and/or state/provincial authorities having jurisdiction over the work

3.6 EXISTING EQUIPMENT

- A. Wiring: The contractor may reuse any abandoned wires. The integrity of the wire and its proper application to the installation is the responsibility of the Contractor. The wire shall be properly identified and tested as per this specification. Unused or redundant wiring must be properly identified as such.
- B. Local Control Panels: The Contractor may reuse any existing local control panel to locate new equipment. All redundant equipment within these panels must be removed. Panel face cover must be patched to fill all holes caused by removal of unused equipment, or replaced with new. Existing panels become the property of the Contractor.
- C. Unless otherwise directed, the Contractor is not responsible for the repairs or replacement of existing energy equipment and systems, valves, dampers, or actuators. Should the Contractor find existing equipment which requires maintenance, the Owner is to be notified immediately.
- D. Temperature Sensor Wells: The Contractor may reuse any existing wells in piping for temperature sensors. These wells shall be modified as required for proper fit of new sensors
- E. Room Thermostats: Shall be removed and become the property of the Contractor, unless otherwise noted
- F. Electronic Sensors and Transmitters: Unless specifically noted otherwise Shall be removed and become the property of the Contractor, unless otherwise noted

3.7 WIRING

- A. All control and interlock wiring shall comply with national and local electrical codes.
- B. All low-voltage wiring shall meet NEC Class 2 requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)

3.8 ACTUATORS

- A. Mount and link control damper actuators per manufacturer's instructions.
 - 1. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage

2. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
3. Provide all mounting hardware and linkages for actuator installation.

B. Electric/Electronic

1. Dampers: Actuators shall be direct-mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° available for tightening the damper seals. Actuators shall be mounted following manufacturer's recommendations
2. Valves: Valves controlled as part of this project will be provided by EMCS contractor for installation by owner.

3.9 IDENTIFICATION OF HARDWARE AND WIRING

- A. All wiring and cabling, including that within factory-fabricated panels, shall be labeled at each end within 5 cm [2"] of termination with the DDC address or termination number.
- B. Permanently label or code each point/object of field terminal strips to show the instrument or item served.
- C. Identify control panels with minimum 1 cm [½"] letters on laminated plastic nameplates.
- D. Identify all other control components with permanent labels. All plug-in components shall be labeled such that removal of the component does not remove the label.
- E. Identify room sensors relating to terminal box or valves with nameplates.

3.10 CONTROLLERS

- A. Provide a separate controller for each AHU or other HVAC system.
- B. Building Controllers and Advanced Application Controllers shall be selected to provide a minimum of 15% spare I/O point/object capacity for each point/object type found at each location. If input /objects are not universal, 15% of each type is required. If outputs are not universal, 15% of each type is required. A minimum of one spare is required for each type of point/object used.
 1. Future use of spare capacity shall require providing the field device, field wiring, point/object database definition, and custom software. No additional controller boards or point/object modules shall be required to implement use of these spare points

3.11 PROGRAMMING

- A. Provide sufficient internal memory for the specified sequences of operation and trend logging. There shall be a minimum of 25% of available memory free for future use.
- B. Point/object Naming: System point/object names shall be modular in design, allowing easy operator interface without the use of a written point/object index. Use the following naming convention:
 1. AAABBBCCDDDEEE where:
 - a. AAA is used to designate the location of the point/object within the building such as mechanical room, wing, or level, or the building itself in a multi-building environment.

- b. BBB is used to designate the mechanical system with which the point/object is associated (e.g., A01, HTG, CLG, LTG).
- c. CCC represents the equipment or material referenced (e.g., SAF for supply air fan , EXF for exhaust fan, RAF for return air fan).
- d. D or DD or DDD may be used for clarification or for identification if more than one of CCC exists (e.g., SAF10, EXF121).
- e. EE represents the action or state of the equipment or medium (e.g., T for temperature, RH for humidity, CO for control, S for status, D for damper control, I for current).

C. Software Programming

- 1. Provide programming for the system and adhere to the sequences of operation provided. The Contractor also shall provide all other system programming necessary for the operation of the system, but not specified in this document. Imbed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
 - a. Text-based:
 - 1. must provide actions for all possible situations
 - 2. must be modular and structured
 - 3. must be commented
 - b. Graphic-based
 - 1. must provide actions for all possible situations
 - 2. must be documented
 - c. Parameter-based
 - 1. must provide actions for all possible situations
 - 2. must be documented
- 2. Operator Interface
 - a. Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point/object information on the graphic displays shall dynamically update. Show on each graphic all input and output points/objects for the system. Also show relevant calculated points/objects such as setpoints
 - b. Show terminal equipment information on a “graphic” summary table. Provide dynamic information for each point/object show
 - c. The Contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all Operator Workstation software and their functions as described in this section. This includes any operating system software, the Operator Workstation database, and any third-party software installation and integration required for successful operation of the operator interface

3.12 CONTROL SYSTEM CHECKOUT AND TESTING

- A. Start-up Testing: All testing listed in this article shall be performed by the Contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the Owner's Representative is notified of the system demonstration.
1. The Contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification
 2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight
 3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures per manufacturers' recommendations
 4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct
 5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The Contractor shall check all control valves and automatic dampers to ensure proper action and closure. The Contractor shall make any necessary adjustments to valve stem and damper blade travel
 6. Verify that the system operation adheres to the Sequences of Operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimum Start/Stop routines.
 7. Alarms and Interlocks
 - a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm
 - b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
 - c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

3.13 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

- A. Demonstration
1. Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed its own tests
 2. The tests described in this section are to be performed in addition to the tests that the Contractor performs as a necessary part of the installation, startup, and debugging process and as specified in the "Control System Checkout and Testing" Article in Part 3 of this specification. The Engineer will be present to observe and review these tests. The Engineer shall be notified at least 10 days in advance of the start of the testing procedures.

3. The demonstration process shall follow that approved in Part 1: "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration
4. The Contractor shall provide at least two persons equipped with two-way communication and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point/object and system. Any test equipment required to prove the proper operation shall be provided by and operated by the Contractor.
5. As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.
6. Demonstrate compliance with Part 1: "System Performance
7. Demonstrate compliance with Sequences of Operation through all modes of operation
8. Demonstrate complete operation of Operator Workstation
9. Additionally, the following items shall be demonstrated:
 - a. DDC Loop Response. The Contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in setpoint, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the setpoint, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.
 - b. Demand limiting. The Contractor shall supply a trend data output showing the action of the demand-limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 30-minute period. Included in the trend shall be building kW, demand limiting setpoint, and the status of shed-able equipment outputs.
 - c. Optimum Start/Stop. The Contractor shall supply a trend data output showing the capability of the algorithm. The hour-by-hour trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas
 - d. Interface to the building fire alarm system
 - e. Operational logs for each system that indicate all setpoints, operating points, valve positions, mode, and equipment status shall be submitted to the Architect/Engineer. These logs shall cover three 48-hour periods and have a sample frequency of not more than 10 minutes. The logs shall be provided in both printed and disk formats.
 - f. Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The Contractor shall be responsible for any necessary repairs or revisions to the hardware or software to successfully complete all tests.

B. Acceptance

1. All tests described in this specification shall have been performed to the satisfaction of both the Engineer and Owner prior to the acceptance of the control system as meeting the requirements of Completion. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Engineer. Such tests shall then be performed as part of the warranty.
2. The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1: "Submittals."

3.14 CLEANING

- A. The Contractor shall clean up all debris resulting from its activities daily. The Contractor shall remove all cartons, containers, crates, etc., under its control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.
- B. At the completion of work in any area, the Contractor shall clean all of its work, equipment, etc., keeping it free from dust, dirt, and debris, etc.
- C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Flexible connections.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 22 07 19 - Plumbing Piping Insulation.
- C. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
- B. AHRI 730 - Flow Capacity Rating and Application of Suction-Line Filters and Suction-Line Filter-Driers; 2005.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2013.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- E. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2013.
- F. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2013.
- G. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- I. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- J. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.

1.4 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
- C. Liquid Indicators:
 - 1. Use line size liquid indicators in main liquid line leaving condenser.
 - 2. Use line size on leaving side of liquid solenoid valves.
- D. Valves:
 - 1. Use service valves on suction and discharge of compressors.
 - 2. Use check valves on compressor discharge.
 - 3. Use check valves on condenser liquid lines on multiple condenser systems.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Strainers:
 - 1. Use line size strainer upstream of each automatic valve.
 - 2. Where multiple expansion valves with integral strainers are used, use single main liquid line strainer.
 - 3. Use shut-off valve on each side of strainer.
- G. Filter-Driers:
 - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
- H. Flexible Connectors: Utilize at or near compressors where piping configuration does not absorb vibration.

1.5 SUBMITTALS

- A. See Section 01300 - Submittals, for submittal procedures.
- B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- C. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- D. Test Reports: Indicate results of leak test, acid test.
- E. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.1 PIPING

- A. Copper Tube: ASTM B 280, H58 hard drawn, sealed ends.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
- B. Pipe Supports and Anchors:
 - 1. Conform to ASME B31.5.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 6. Vertical Support: Steel riser clamp.
 - 7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
 - 9. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 - 10. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.2 MOISTURE AND LIQUID INDICATORS

- A. Manufacturers:
 - 1. Henry Technologies: www.henrytech.com/#sle.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 - 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.

- B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

2.3 VALVES

A. Manufacturers:

1. Hansen Technologies Corporation: www.hantech.com/#sle.
2. Henry Technologies: www.henrytech.com/#sle.
3. Flomatic Valves: www.flomatic.com/#sle.

B. Ball Valves:

1. Two piece bolted forged brass body with teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.

2.4 STRAINERS

A. Straight Line or Angle Line Type:

1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

2.5 CHECK VALVES

A. Manufacturers:

1. Hansen Technologies Corporation: www.hantech.com/#sle.
2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.

B. Straight Through Type:

1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 200 degrees F.

2.6 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Circuit Hydraulics, Ltd: www.circuit-hydraulics.co.uk/#sle.
2. Flexicraft Industries: www.flexicraft.com/#sle.
3. Penflex: www.penflex.com/#sle.

- B. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.5.
 - 2. Steel hanger rods and clevis shall be cadmium or zinc plated.
 - 3. Support horizontal piping as indicated.
 - 4. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 5. Place hangers within 12 inches of each horizontal elbow.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
- G. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- H. Provide clearance for installation of insulation and access to valves and fittings.
- I. Provide access to concealed valves and fittings. Coordinate size and location of access doors with Section 08 31 00.
- J. Flood piping system with nitrogen when brazing.
- K. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
- L. Insulate piping and equipment; refer to Section and Section 22 07 16.

- M. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- N. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- O. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- P. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.
- Q. Fully charge completed system with refrigerant after testing.
- R. Provide electrical connection to solenoid valves. Refer to Division 16.

3.3 FIELD QUALITY CONTROL

- A. Test refrigeration system in accordance with ASME B31.5.
- B. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test to no leakage.

3.4 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 - 1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
 - 4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 5. 2-1/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 6. 2-5/8 inch OD: Maximum span, 9 feet; minimum rod size, 3/8 inch.

END OF SECTION

SECTION 23 31 00

HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal ductwork.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 230713 - Duct Insulation.
- C. Section 23 33 00 - Air Duct Accessories.
- D. Section 23 37 00 - Air Outlets and Inlets.

1.3 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- C. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- E. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.
- F. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

1.4 RELATED SECTIONS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
- C. The requirements of this Section apply to all Work of Division 23.
- D. Section 013300 - Submittals.

1.5 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.

- B. Product Data: Provide data for duct materials.
- C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all ductwork systems. Provide 1/4"=1'-0" ductwork layout plans showing duct routing, offsets, fittings, duct accessories, fire/smoke dampers, hydronic piping, seismic bracing, etc. Shop drawings shall be fully coordinated with all other trades, including the building structure, finishes, fire sprinkler piping, plumbing piping, hydronic piping and electrical systems.
- D. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.7 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.1 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

2.2 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
 - 4. Manufacturers:
 - a. Design Polymeric: www.designpoly.com.com/#sle.
 - b. Ductmate Industries, Inc, a DMI Company: www.ductmate.com/#sle.

- C. Gasket Tape: Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle rings connections.
- D. Insulated Flexible Ducts:
 - 1. Flexible ducts shall be U.L. listed and shall comply with UMC Standard 6-1.
 - 2. Flexible ducts shall have a flame spread index of not more than 25 and a smoke-density index not exceeding 50 when tested as a composite material.
 - 3. The maximum length of flexible ductwork shall be 5 feet. Ductwork shall be extended to full length whenever possible without severe bends or kinks. Bends shall be made to maintain R/W equal to 1.5.
 - 4. Black polymer film supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
 - a. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 - b. Insulation shall be 1-1/2 inch thick fiberglass.
 - c. Maximum Velocity: 4000 fpm.
 - d. Temperature Range: -20 degrees F to 175 degrees F.

2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- D. Round ductwork shall be spiral lockseam, 24 gauge minimum. Round ductwork exposed within occupied spaces shall be spiral lockseam, 20 gauge minimum.
- E. Rectangular ductwork exposed within occupied spaces shall be 20 gauge minimum.
- F. Ductwork exposed within occupied spaces shall be internally sealed to provide a clean exterior appearance.
- G. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- H. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- I. Fittings shall be spot welded and internally sealed.
- J. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Duct sizes indicated are inside dimensions. For lined ducts, duct sizes must be increased to account for lining.
- D. Indoor Applications: Seal all standing seams and transverse joints in all sheetmetal ductwork with Hardcast "Iron Grip" premium flexible water based duct sealant.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use double nuts and lock washers on threaded rod supports.
- G. Connect diffusers boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
- H. Use stainless steel for ductwork exposed to view in Kitchen areas.
- I. Kitchen hood exhaust ductwork shall so be constructed and installed that grease cannot be pocketed in any portion thereof, and the system shall slope not less than 1/4 unit vertical in 12 units horizontal (2% slope) toward the hood or toward an approved grease reservoir.
- J. Kitchen hood exhaust ductwork shall be wrapped with a 2 hour fire resistive duct wrap designed for use specifically with kitchen grease ducts, Pabco Super Firetemp fireproofing board, or equal, installed in accordance with manufacturer's installation instructions.

END OF SECTION

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air turning devices.
- B. Backdraft dampers - metal.
- C. Combination fire and smoke dampers.
- D. Duct access doors.
- E. Duct test holes.
- F. Flexible duct connectors.
- G. Volume control dampers.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 23 31 00 - HVAC Ducts and Casings.

1.3 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- D. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.
- E. UL 1978 - Grease Ducts; Current Edition, Including All Revisions.

1.4 RELATED SECTIONS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
- C. The requirements of this Section apply to all Work of Division 23.
- D. Section 013300 - Submittals.

1.5 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.

1.6 PROJECT RECORD DOCUMENTS

- A. Record actual locations of access doors and test holes.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES

- A. Manufacturers:
 - 1. ProRail, Ductmate Industries, Inc.
 - 2. Duro Dyne Corp.
- B. Manufactured turning vanes with 2" single thickness curved blades set at 1-1/2" on-center mounted in 2" vane rails, self-aligning, hot dipped galvanized steel.
- C. Turning vanes, vane rails and mounting shall be constructed and installed in accordance with the SMACNA "HVAC Duct Construction Standards".

2.2 BACKDRAFT DAMPERS - METAL

- A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.
- B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.3 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Ductmate Industries, Inc, a DMI Company: www.ductmate.com/#sle.
 - 2. Ruskin Company: www.ruskin.com/#sle.

3. Ward Industries, a brand of Hart and Cooley, Inc: www.wardind.com/#sle.
 4. or equal.
- B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
1. High Temperature Duct Access Doors:
 - a. Comply with NFPA 96.
 - b. Comply with UL 1978.
- C. Access doors with sheet metal screw fasteners are not acceptable.

2.4 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.5 FLEXIBLE DUCT CONNECTORS

- A. Manufacturers:
1. Ductmate Industries, Inc, a DMI Company: www.ductmate.com/#sle.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Flexible Duct Connections (Indoors): Fabric crimped into metal edging strip.
1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 2. Metal: 3 inches wide, 24 gauge, 0.0239 inch thick galvanized steel.
- D. Flexible Duct Connections (Outdoors): Fabric crimped into metal edging strip.
1. Fabric: Ventfabrics Ventlon UL listed fire-retardant duPont's Hypalon coated woven glass fiber fabric to NFPA 90A, minimum density 26 oz per sq yd, sunlight, ozone and weather resistant.
 - a. Net Fabric Width: Approximately 3 inches wide.
 2. Metal: 3 inches wide, 24 gage thick galvanized steel.

2.6 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers for Round Ductwork and Rectangular Ductwork up to 10 inches in Height: 16 gauge steel minimum.
- C. Multi-Blade Damper for Rectangular Ductwork: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware; Model CD35 Manufactured by Ruskin. Provide Ruskin Model CD50 for installation in medium pressure ductwork and/or ducts with velocities exceeding 1500 FPM.

- D. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings, Ventlok Model 607. On multiple blade dampers, provide oil impregnated nylon or sintered bronze bearings.
- E. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. Provide balancing dampers at points on supply, return, outside air and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 23 34 23

HVAC POWER VENTILATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof exhausters.
- B. Ceiling exhaust fans.
- C. Inline centrifugal fans.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.

1.3 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; <http://www.amca.org/certified/search/company.aspx>.
- B. AMCA 99 - Standards Handbook; 2010.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.
- E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.
- G. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.
- H. UL 705 - Power Ventilators; Current Edition, Including All Revisions.
- I. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

1.4 RELATED SECTIONS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
- C. The requirements of this Section apply to all Work of Division 23.

D. Section 013300 - Submittals.

1.5 SUBMITTALS

- A. See Section 013300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Protect units from physical damage by storing indoors or off site until roof mounting curbs or other mountings are in place, ready for immediate installation of units.

1.8 WARRANTY

- A. See Section 01700 - Contract Closeout, for additional warranty requirements.
- B. Provide a full parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

1.9 FIELD CONDITIONS

1.10 EXTRA MATERIALS

- A. Supply two sets of belts for each fan.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Greenheck Fan Corporation: www.greenheck.com/#sle.
- B. Loren Cook Company: www.lorencook.com/#sle.

2.2 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Comply with AMCA 99.
- E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.3 ROOF EXHAUSTERS

- A. Product Requirements:
 - 1. Performance Ratings: Conform to AMCA 210 and bearing the AMCA Certified Rating Seal.
 - 2. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.
 - 3. Fabrication: Conform to AMCA 99.
 - 4. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- B. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.
- C. Roof exhaust fans shall be centrifugal belt driven type. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced. The fan housing shall be constructed of heavy gauge aluminum with a rigid internal support structure. The fan shroud shall have a rolled bead for added strength.
- D. Motors shall be heavy duty ball bearing type, carefully matched to the fan load, and furnished at the specified voltage, phase and enclosure. Motors and drives shall be mounted on vibration isolators, out of the airstream. Fresh air for motor cooling shall be drawn into the motor compartment from an area free of discharge contaminants. Motors shall be readily accessible for maintenance.
- E. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts. Motor pulleys shall be adjustable for final system balancing.
- F. A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment.
- G. A fan conduit chase shall be provided through the curb cap to the motor compartment for ease of installation.
- H. All fans shall bear the AMCA Certified Ratings Seal for sound and air performance.

- I. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.
- J. Fans shall be Model CUBE as manufactured by Greenheck, or equal, as specified on drawings.
- K. Roof Curb: 12 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips, and insulation.
- L. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.
- M. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- N. See drawing schedule for additional optional equipment requirements.

2.4 CEILING EXHAUST FANS

- A. The fan wheel shall be of the galvanized steel, forward curved, centrifugal type. Wheels shall be dynamically and statically balanced.
- B. Motors shall be of the heavy duty type with permanently sealed ball bearings. The wheel shaft shall be ground and polished steel mounted in permanently sealed pillow block bearings. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the machined cast iron type, keyed and securely attached to the wheel and motor shafts. The motor pulleys shall be adjustable for final system balancing.
- C. All fans shall bear the AMCA Certified Ratings Seal for air performance.
- D. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- E. Fans shall be Model SP and manufactured by Greenheck or equal.
- F. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing, resilient mounted motor.
- G. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and wall mounted switch.
- H. Grille: Aluminum with baked white enamel finish.
- I. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.5 INLINE CENTRIFUGAL FANS

- A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- B. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and wall mounted switch.

- C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- D. Provide flexible duct connections at inlet and outlet of fan.
- E. Provide housed spring isolators for fan support.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with stainless steel lag screws to roof curb. See drawings for additional mounting requirements.
- C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.
- D. Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- E. Provide sheaves required for final air balance.
- F. Provide speed control on direct drive fans required for final air balance.
- G. Install backdraft dampers on inlet to roof exhausters.
- H. Provide backdraft dampers on outlet from cabinet and ceiling exhaust fans and as indicated.

END OF SECTION

SECTION 23 35 16

ENGINE EXHAUST SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ductwork and duct accessories.

1.2 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; <http://www.amca.org/certified/search/company.aspx>.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. AWS D9.1/D9.1M - Sheet Metal Welding Code; 2018.
- E. AWS D9.1M/D9.1 - Sheet Metal Welding Code; 2012.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- G. SMACNA (ROUND) - Round Industrial Duct Construction Standards; 1999.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Submittals.
- B. Product Data: Provide manufacturers literature and data sheets indicating rated capacities, dimensions, weights and point loadings, accessories, electrical characteristics and connection requirements, wiring diagrams, and location and sizes of field connections.
- C. Shop Drawings: Indicate dimensions, sizes, weights and point loadings, and locations and sizes of field connections.
- D. Manufacturer's Installation Instructions: Include assembly and installation instructions.
- E. Operation and Maintenance Data: Include instructions for fan lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.4 FIELD CONDITIONS

- A. Permanent exhaust system may not be used for ventilation during construction.

PART 2 PRODUCTS

2.1 DUCTWORK AND DUCT ACCESSORIES

A. Materials:

1. Galvanized Steel Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
2. Coated Galvanized Steel Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 zinc coating and 4 mil polyvinyl chloride coating inside and out.

B. Ductwork:

1. Fabricate and support in accordance with:
 - a. SMACNA (DCS).
 2. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline.
 3. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
 4. Fabricate continuously welded round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA (ROUND).
 5. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow, with liquid adhesive plus sheet metal screws.
 6. Joints: Minimum 4 inch cemented slip type, brazed or electric welded to comply with AWS D9.1/D9.1M. Prime coat welded joints.
 7. Provide standard 45 degree lateral wye branch fittings unless otherwise indicated.
 8. Use double nuts and lock washers on threaded rod supports.
- C. Flexible Connectors: UL listed, fire-retardant polyethylene impregnated fabric, minimum density 20 oz per sq yd, approximately 2 inches wide, crimped into metal edging strip.
- D. Coordinate ductwork requirements with Air & Lube drawings and specifications.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Install flexible connections at fan inlet and discharge. Ensure metal bands of connectors are parallel with minimum 1 inch flex between ductwork and fan while running.
- C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

- D. Coordinate installation requirements with Air & Lube drawings and specifications.

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Diffusers
- B. Registers/grilles
- C. Door grilles.
- D. Louvers:
- E. Roof hoods.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Section 09 91 23 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.3 REFERENCE STANDARDS

- A. ADC 1062: GRD - Test Code for Grilles, Registers & Diffusers; Air Diffusion Council; 1984.
- B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.
- C. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.
- D. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers; 2015.
- E. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- H. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- I. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
- J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.4 RELATED SECTIONS

- A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.

- B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
- C. The requirements of this Section apply to all Work of Division 23.
- D. Section 013300 - Submittals.

1.5 SUBMITTALS

- A. See Section 013300 - Submittals, for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- C. Project Record Documents: Record actual locations of air outlets and inlets.

1.6 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Krueger-HVAC: www.krueger-hvac.com/#sle.
- B. Price Industries: www.price-hvac.com/#sle.
- C. Ruskin Company: www.ruskin.com/#sle.
- D. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/#sle.
- E. Tuttle and Bailey: www.tuttleandbailey.com/#sle.
- F. Greenheck.
- G. Cook

2.2 DIFFUSERS

- A. Frame: Provide surface mount, snap-in, inverted T-bar, and spline type. In plaster ceilings, provide plaster frame and ceiling frame.
- B. Fabrication: Steel or aluminum with baked enamel finish.
- C. Color by Architect.
- D. Accessories: Provide radial opposed blade, butterfly, combination splitter, and volume control damper; removable core, sectorizing baffle, safety chain, wire guard, equalizing grid, operating rod extension, and gaskets for surface mounted diffusers with damper adjustable from diffuser face.

E. SEE DRAWINGS FOR DIFFUSER SPECIFICATIONS.

2.3 REGISTERS/GRILLES

- A. Frame: Provide surface mount, snap-in, inverted T-bar, and spline type. In plaster ceilings, provide plaster frame and ceiling frame.
- B. Fabrication: Steel or aluminum with baked enamel finish.
- C. Color by Architect.
- D. Accessories: Provide radial opposed blade, butterfly, combination splitter, and volume control damper; removable core, sectorizing baffle, safety chain, wire guard, equalizing grid, operating rod extension, and gaskets for surface mounted diffusers with damper adjustable from diffuser face.
- E. SEE DRAWINGS FOR REGISTER/GRILLE SPECIFICATIONS.

2.4 DOOR GRILLES

- A. Type: V-shaped louvers of 20 gauge, 0.0359 inch thick steel, 1 inch deep on 1/2 inch centers.
- B. Frame: 20 gauge, 0.0359 inch steel with auxiliary frame to give finished appearance on both sides of door, with factory prime coat finish.

2.5 LOUVERS

- A. Type: 4 and 6 inches deep as required by wall type with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over exhaust and 1/2 inch square mesh screen over intake.
- B. Color: To be selected by Architect from manufacturer's full range.
- C. Fabrication: 12 gage thick extruded aluminum, welded assembly, with factory prime coat finish color to be selected by architect.

2.6 COMBINATION LOUVERS

- A. Damper-combined, drainable louver:
- B. Size: As indicated on the drawings.
- C. Material: Extruded aluminum.
- D. Paint Finish and Color: To be selected by Architect from manufacturer's full range.
- E. Sleeve or Flange: Factory-mounted standard.
- F. Linkage: Concealed in frame.

2.7 ROOF HOODS

- A. Fabricate of galvanized steel, minimum 16 gauge, 0.0598 inch base and 20 gauge, 0.0359 inch hood, or aluminum, minimum 16 gauge, 0.0598 inch base and 18 gauge, 0.0598 inch hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake, and factory prime coat finish.
- B. Fabricate louver penthouses with mitered corners and reinforce with structural angles.

- C. Mount unit on minimum 12 inch high curb base with insulation between duct and curb.
- D. Make hood outlet area minimum of twice throat area.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.
- C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- D. Install diffusers to ductwork with air tight connection.
- E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 23.

END OF SECTION

SECTION 23 74 13

PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Packaged Air Conditioning Unit.
- B. Indirect/Direct Evaporative Cooling Unit.
- C. Makeup Air Unit.

1.2 RELATED REQUIREMENTS

- A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.
- B. Division 16 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.
- B. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment; 2008.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- D. Unit shall be designed to conform to ASHRAE 15, latest revision, and in accordance with UL 1995.
- E. Units shall be UL tested and certified in accordance with ANSI Z21.47 Standard. Units may be ETL listed.
- F. New roof curbs shall be designed to conform to NRCA Standards.
- G. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

1.4 SUBMITTALS

- A. See Section 01300 - Submittals, for submittal procedures.
- B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- C. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in PCCD's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.7 WARRANTY

- A. See Section 01700 - Contract Closeout, for additional warranty requirements.
- B. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- C. Provide a one year warranty to include coverage for refrigeration compressors.
- D. Provide a full parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.
- E. Provide five year limited warranty for heat exchanger including materials only.
- F. Furnish one complete set of fan motor drive belts.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Packaged Air Conditioning Units
 - 1. The Trane Company.
 - 2. or equal.
- B. Indirect/Direct Evaporative Cooling Units
 - 1. Air2O.
 - 2. or equal.
- C. Makeup Air Units
 - 1. Greenheck.
 - 2. or equal.

2.2 PACKAGED AIR CONDITIONING UNITS

- A. General
 - 1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.

2. Factory assembled, single piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.
 3. Unit shall use R-410a refrigerant.
 4. Unit shall be installed in accordance with the manufacturer's instructions.
 5. Unit must be selected and installed in compliance with local, state, and federal codes.
 6. Unit shall meet ASHRAE 90.1 and IECC minimum efficiency requirements.
 7. Unit shall be rated in accordance with AHRI Standards 210/240 and 340/360.
 8. Unit shall be designed to conform to ASHRAE 15.
 9. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL or ETL-listed and certified under Canadian standards as a total package for safety requirements.
 10. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
 11. Unit internal insulation linings shall be resistant to mold growth in accordance with "mold growth and humidity" test in ASTM C1338, G21, and UL 181 or comparable test method. Air stream surfaces shall be evaluated in accordance with the "Erosion Test" in UL 181, as part of ASTM C1071.
 12. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
 13. Roof curb shall be designed to conform to NRCA Standards.
 14. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.
 15. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.
 16. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.
- B. Delivery, Storage, and Handling:
1. Unit shall be stored and handled per manufacturer's recommendations.
 2. Unit shall only be stored or positioned in the upright position.
- C. Operating Characteristics:
1. Unit shall be capable of starting and running at 125°F (52°C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 340/360 at ± 10% voltage.
 2. Compressor with standard controls shall be capable of operation from 35°F (2°C), ambient outdoor temperatures. Accessory kits are necessary if mechanically cooling at ambient temperatures below 35°F (2°C).
- D. Unit Cabinet:
1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a pre-painted baked enamel finish on all externally exposed surfaces.

2. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum 1/2-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the heat compartment.
 3. Unit internal insulation linings shall be resistant to mold growth in accordance with “mold growth and humidity” test in ASTM C1338, G21, and UL 181 or comparable test method. Air stream surfaces shall be evaluated in accordance with the “Erosion Test” in UL 181, as part of ASTM C1071.
 4. Condensate Pan and Connections:
 - a. Shall be a sloped condensate drain pan made of a non-corrosive material.
 - b. Shall comply with ASHRAE Standard 62.
 5. Gas Connections:
 - a. All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location.
 6. Electrical Connections:
 - a. All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location.
 7. Component Access Panels (standard):
 - a. Cabinet panels shall be easily removable for servicing.
- E. Gas Heat:
1. Heat exchanger shall be an induced draft design. Positive pressure heat exchanger designs shall not be allowed.
 2. Shall incorporate a direct-spark ignition system and redundant main gas valve.
 3. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.
 4. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor.
 5. Unit shall be equipped with anti-cycle protection with one short cycle on unit flame roll-out switch or 4 continuous short cycles on the high temperature limit switch.
 6. Standard Heat Exchanger Construction:
 - a. Heat exchanger shall be of the tubular-section type constructed of a minimum of 20-gauge steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
 7. Optional Stainless Steel Heat Exchanger Construction:
 - a. The optional stainless steel heat exchanger shall be of the tubular-section type, constructed of a mini-mum of 20-gauge type 409 stainless steel.
 8. Optional Low NOx Heat Exchanger Construction:

- a. Low NOx reduction shall be provided to reduce nitrous oxide emissions to meet California's Air Quality Management District (SCAQMD) low-NOx emissions requirement of 40 nanograms per joule or less.
- F. Coils:
1. Standard Aluminum Fin/Copper Tube Coils:
 - a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
 2. Optional Pre-Coated Aluminum-Fin Condenser Coils:
 - a. Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments.
 - b. Corrosion durability of fin stock shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.
- G. Refrigerant Components:
1. Refrigerant circuit shall include the following control, safety, and maintenance features:
 - a. Thermostatic Expansion Valve (TXV) shall help provide optimum performance across the entire operating range. Shall contain removable power element to allow change out of power element and bulb without removing the valve body.
 - b. Refrigerant filter drier.
 - c. Service gauge connections on suction and discharge lines.
 2. Compressors:
 - a. Unit shall use fully hermetic, scroll compressors.
 - b. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
 - c. Compressors shall be internally protected from high discharge temperature conditions.
 - d. Compressors shall be protected from an over-temperature and over-ampereage conditions by an internal, motor overload device.
 - e. Compressor shall be factory mounted on rubber grommets.
 - f. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.
 - g. Crankcase heaters shall be utilized on all models to protect compressor with specific refrigerant charge.
- H. Filter Section:
1. Shall consist of factory-installed, low velocity, throw-away 2-in. thick fiberglass filters.
 2. Filters shall be standard, commercially available sizes.
- I. Evaporator Fan and Motor:
1. Evaporator fan motor:

- a. Shall have permanently lubricated bearings.
 - b. Shall have inherent automatic-reset thermal overload protection or circuit breaker.
 - c. Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating shall be required.
2. Evaporator fan:
 - a. Blower fan shall be double-inlet type with forward-curved blades.
 - b. Shall be constructed from steel with a corrosion resistant finish and dynamically balanced.
- J. Condenser Fans and Motors:
1. Condenser fan motors:
 - a. Shall be a totally enclosed motor.
 - b. Shall use permanently lubricated bearings.
 - c. Shall have inherent thermal overload protection with an automatic reset feature.
 2. Condenser fans:
 - a. Shall be a direct driven propeller type fan and shall be dynamically balanced.
- K. Special Features Options and Accessories:
1. Low Ambient Controller:
 - a. Controller shall control coil head pressure by condenser-fan speed modulation or condenser-fan cycling and wind baffles.
 - b. Shall consist of solid-state control and condenser-coil temperature sensor to maintain condensing temperature at outdoor ambient temperatures down to 0°-F (-18°-C). (Not available on 11 size models as standard unit cooling operation down to 0°-F /-18°-C).
 2. Condenser Coil Hail Guard Assembly:
 - a. Shall protect against damage from hail.
 - b. Shall be of louvered style.
 3. Flue Discharge Deflector:
 - a. Flue discharge deflector shall direct unit exhaust vertically instead of horizontally.
 - b. Deflector shall be defined as a “natural draft” device by the National Fuel and Gas (NFG) code.
 4. Economizer:
 - a. Independent modules for vertical or horizontal return configuration shall be available. Vertical return modules shall be available as a factory-installed option.
 - b. Ultra low leak design meets California Title 24 and, ASHRAE 90.1 and IECC requirements.
 - c. Shall be capable of introducing up to 100% outdoor air.

- d. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.
 - e. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
 - f. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
 - g. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1-2016 and IECC-2015 requirements.
 - h. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
 - i. Dampers shall be completely closed when the unit is in the unoccupied mode.
 - j. Integrated, gear driven opposing modulating blade design type capable of simultaneous economizer and compressor operation.
 - k. Combined minimum and DCV maximum damper position potentiometers with compressor staging relay.
 - l. On-board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, per California Title 24.
 - m. Dry bulb outdoor air temperature sensor shall be provided as standard. Enthalpy sensor is also available on factory-installed only. Outdoor air sensor setpoint shall be adjustable and shall range from 40 to 100°F (4 to 38°C). Additional sensor options shall be available as accessories.
5. Power Exhaust:
- a. Power exhaust shall be used in conjunction with an integrated economizer.
 - b. Independent modules for vertical or horizontal return configurations shall be available.
 - c. Horizontal power exhaust shall be mounted in return ductwork.
 - d. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0 to 100% adjustable setpoint on the economizer control.
6. Roof Curbs (Vertical):
- a. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
 - b. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.
7. Winter Start Kit:
- a. Shall contain a bypass device around the low pressure switch.
 - b. Shall be required when mechanical cooling is required down to 25°F (-4°C).

- c. Shall not be required to operate on an economizer when below an outdoor ambient of 40°F (4°C).
- 8. Anti-short Cycle Timer:
 - a. Shall prevent compressor short cycling by providing a 5-minute delay (± 2 minutes) before restarting a compressor after shutdown for any reason.
 - b. One device shall be required per compressor.
- 9. Hinged Access Panels:
 - a. Shall provide easy access through integrated quarter turn latches.
 - b. Shall be on major panels of — filter, control box, fan motor and compressor

2.3 INDIRECT/DIRECT EVAPORATIVE COOLING UNITS

A. General:

- 1. Unit shall be Factory wired, piped, and tested prior to shipment.
- 2. Unit shall be capable of supplying air at 125% wet bulb efficiency, or higher.

B. Unit Construction:

- 1. Unit shall be constructed using 2" (50mm) double wall G90 powder coated galvanized steel, with 304 stainless steel lining on all water contact areas. Insulation is closed cell injected foam with an R value of 6.36 ft²·°F·h/BTU. Fiberglass or batt insulation is not acceptable.
- 2. Powder coated galvanized steel is tested per ASTM B117 standards to withstand 480 hour salt spray test with no coating exfoliation observed.
- 3. Unit shall be designed for outdoor installation.

C. Indirect Heat Rejector:

- 1. A. Unit shall contain an indirect heat rejection section with the following features:
 - a. Long life 7090 12" evaporative media
 - b. Direct drive axial fan
 - c. Circulating pump manufactured from 304 stainless steel, with protection for thermal cutout and dry operation.
 - d. Fill and drain controls for sump

D. Supply Air Intake:

- 1. Unit shall contain the following features at the supply air intake:
 - a. Rain Hood
 - 1. Bug screen
 - 2. 1" MERV 8 Metal Mesh Filter

E. Supply Fan:

- 1. Unit shall contain a supply fan with the following features:

- a. Direct drive centrifugal plenum type fan with high efficiency EC Motor
 - b. Permanently lubricated bearings with 40,000 hour life.
 - c. Supply fan shall be dynamically vibration balanced for smooth operation at all speeds to BV-2.
 - d. Supply fan shall be located before the indirect and direct sections in the air stream and be accessible through a removable panel.
- F. Indirect Heat Exchanger:
1. Unit shall contain an indirect cooling heat exchanger in the supply air stream with the following features:
 - a. 6 row, 12 Fin/Inch water coil with 0.016” thick copper tube walls and 0.0047” thick blue hydrophilic aluminum fins.
 - b. Must have greater than or equal 100 Btu/(hr ft °F) (200/ W/(m °K)) of thermal conductivity for maximum heat transfer.
 - c. Sloped to allow for passive water draining.
- G. Direct Evaporative Section:
1. Unit shall contain a direct evaporative cooling section with the following features:
 - a. 6” 5090 direct evaporative media
 - b. 304 Stainless steel circulating pump
 - c. Molded polymer drift eliminator
- H. Controls:
1. Manufacturer to provide a 24v digital control, printed circuit board containing diagnostic indicator lights, a low voltage terminal strip, LCD display with plain English diagnostics, and function keys. Modbus or BACnet compatibility shall be included.
- I. Power:
1. Unit shall have a single point power connection to power the fans, pumps, and controls.
 2. Phase loss protection shall be included.

2.4 MAKEUP AIR UNITS

A. General

1. Make-Up Air unit shall be as manufactured by Greenheck or approved equal provided all specifications are met. Greenheck Model IGX equipment is used as the basis of design. Performance to be as scheduled on plans.

B. Furnace and Controls

1. Indirect-gas fired furnace shall be 80% efficient, ETL list and have a blow through fan design. Furnace shall be capable of operation with Natural or LP gas and have a power venting system. The heat exchanger shall be constructed of stainless steel. Standard furnace features shall include main gas pressure regulator, main gas valve, electronic staged or electronic modulating controls, direct spark ignition system, high limit and a 24 volt control transformer. Furnace shall be insulated and have double wall construction.

C. Temperature Control

1. Furnace heat output shall be controlled based on a field adjustable discharge temperature set point. Discharge temperature sensor shall be factory mounted and wired to the unit control center. Furnace(s) shall have electronic modulation or at least two stages of control.

D. Unit Casing and Frame

1. Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable doors.

E. Insulation

1. Models provided with a mixing box shall be insulated from the return section through to the supply discharge. Insulation shall be in accordance with NFPA 90A and tested to meet UL 181 erosion requirements. Double wall shall be provided if specified.

F. Fan Section

1. Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally spring isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks (size 120 and larger). Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

G. Motors and Drives

1. Motors shall be energy efficient, single or two speed as indicated with ODP enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horsepower and less shall be supplied with an adjustable drive pulley.

H. Electrical

1. All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 120 VAC circuit, integral door interlocking disconnect switch with separate motor fusing and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

I. Filter Section

1. Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 feet per minute. Filters shall be easily accessible through a removable access panel.

J. Evaporative Cooler Section

1. Evaporative cooling section shall include a galvanized steel housing with louvered intake, two inch aluminum mesh filters and a stainless steel evaporative cooling module all

provided by the make-up air unit manufacturer. Evaporative cooling media shall be Munters CELdek with a depth of 12 inches for a cooling effectiveness of 90%. Drain and overflow connections shall be piped through the side of the evaporative cooling section. Provide with "Water Wizard" evaporative cooling system control.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that proper power supply is available.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 90A.
- C. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3.3 SYSTEM STARTUP

- A. Provide factory start-up and supervise installation by Contractor.
- B. The indirect/direct evaporative cooling units TDS & Hardness of on-site water shall be measured at startup and used to set a timed blowdown interval to maintain evaporative media life. Hardness of water should not exceed 15 grains/gallon.

END OF SECTION

SECTION 23 81 26.13

SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air cooled condensing units.
- B. Indoor air handling (fan and coil) units for ducted systems.
- C. Indoor air handling (fan and coil) units for ductless systems.
- D. Controls.

1.2 RELATED REQUIREMENTS

- A. Section 23 31 00 - HVAC Ducts and Casings.

1.3 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.
- B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.
- C. ASHRAE Std 23.1 - Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units; 2010.
- D. NEMA MG 1 - Motors and Generators; 2014.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- G. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Submittals.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Design Data: Indicate refrigerant pipe sizing.
- E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

- G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in PCCD's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.6 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Mitsubishi Electric: www.mitsubishicomfort.com
- B. Trane Inc: www.trane.com/#sle.

2.2 SYSTEM DESIGN

- A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
 - 1. Heating and Cooling: Air-source electric heat pump located in outdoor unit with evaporator; auxiliary electric heat.
 - 2. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
- B. Performance Requirements: See Drawings for additional requirements.

2.3 INDOOR AIR HANDLING UNITS FOR DUCTED SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
 - 1. Air Flow Configuration: Upflow.
 - 2. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
- B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
 - 1. Motor: NEMA MG 1; 1750 rpm single speed, permanently lubricated, hinge mounted.
 - 2. Motor Electrical Characteristics:
- C. Air Filters: 1 inch thick glass fiber, disposable type arranged for easy replacement.
- D. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.

1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
2. Manufacturers: System manufacturer.

2.4 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
- B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
 1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
 2. Manufacturer: System manufacturer.

2.5 OUTDOOR UNITS

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
 1. Comply with AHRI 210/240.
 2. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
- C. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
 1. Provide thermostatic expansion valves.
 2. Provide heat pump reversing valves.
- D. Operating Controls:
 1. Control by room thermostat to maintain room temperature setting.
 2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig and off when pressure drops below 140 psig for operation to 0 degrees F.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.

END OF SECTION

SECTION 26 01 10
GENERAL REQUIREMENTS, ELECTRICAL

PART 1 - GENERAL

1.1 CONTRACT PROVISIONS

- A. The requirements of this Section are in addition to the requirements of Division 1, General Conditions and Supplementary Conditions.

1.2 SUMMARY

- A. This section describes the requirements for the electrical work includes, among others, the furnishing and installation of the following:
1. Electrical service from the Main Switchboard to the building Distribution Panel including transformer, conduit and trenching, conductors.
 2. Power distribution system.
 3. Grounding system.
 4. Lighting and lighting control systems.
 5. Wiring systems including power wiring to plumbing and HVAC and other misc. appliances and equipment.
 6. Communications management system (voice/video/media/clock)
 7. Computer data systems, outlets, raceway and cabling.
 8. Intrusion alarm and security systems.
 9. Emergency egress lighting.
 10. Fire alarm system.
 11. Photovoltaic System (Additive Alternate)
 12. Testing and commissioning.
- B. Furnish and install all electrical equipment and systems as shown on the Drawings and as described in this Division of the Specifications to provide a complete and functional electrical installation. This work includes but is not limited to all material and labor required for installation of electrical and special systems complete as described herein this specification and drawings; and connections (and installation where not otherwise provided for) of electrical equipment furnished by others. Provide

and install all items of equipment, devices, supports, etc., which are incidental to the major components shown on the Drawings or described in these Specifications.

1.3 RELATED WORK INCLUDED IN OTHER DIVISIONS

- A. Finish painting except factory applied finishes and repair of factory finishes shall be provided in accordance with appropriate sections of this Specification. Coordinate "painting" requirements of this Division with other trades as required to assure timely and satisfactory completion of required work. In finished areas, all exposed raceway, boxes, galvanized steel box covers (where allowed), and other electrical "structure" shall be finished to match adjacent structures. Verify that all raceway openings are closed and box covers are in place prior to finishing work done by others.
- B. Examine the drawings and specification for mechanical equipment and provide electrical installation for heating, ventilation and air conditioning equipment, motors, pumps and associated motor starters and controls as described in Division 23.
- C. Examine the Architectural drawings and specification for electrical appliances and equipment which may not be shown on the plans to include and provide electrical installations as described in the architectural division of work.
- D. Examine the Architectural drawings and provide all construction necessary to maintain the integrity of the fire rated barriers.
- E. Examine the Architectural drawings and coordinate with the Architect to provide access doors, whether shown on drawings or not, where floors, walls, or ceiling must be penetrated for access to electrical equipment, outlet boxes, devices, etc., and as specified in this specification.
- F. Provide and install, as part of the work described in this Division, all power and control wiring fed from a source of 30 Volts or more (i.e. all wiring except temperature control wiring) for mechanical equipment described in Division 23.
- G. Examine the fire sprinkler system drawings and specifications for electrical work which may not be shown on the electrical and/or fire detection and alarm plans to be included in the electrical work as necessary as described in the Division 21 fire sprinkler system.

1.4 APPLICATION OF OTHER DIVISIONS

- A. Where carpentry, masonry, concrete work, painting, etc., is required in the installation of equipment specified under this Division, the work shall be done in accordance with the applicable Division of these Specifications. This work could include for example: work associated with panelboard installation, equipment pads or bases, support structures, etc.

1.5 DRAWINGS AND SPECIFICATIONS

- A. The information presented in these Specifications, and on the drawings, is intended to describe the utilitarian and physical aspects of the systems shown as well as the quality of the entire installation. All information is as complete and thorough as possible, but every condition or situation cannot be anticipated. Exact locations, dimensions, elevations, etc. must be determined "on the job" with careful attention to the "intent" of the Drawings and Specifications.

- B. The above paragraph shall not be construed as to allow significant deviation from either the Drawings or Specifications without prior approval of the Architect, but minor changes in conduit routing or equipment locations may be required or desired due to specific conditions encountered. This work shall be accomplished in accordance with these Specifications and no "extra charges" are to be created for any unanticipated labor or material.
- C. Any error or omissions of detail in either the drawings or the specifications shall not relieve the Contractor from correctly installing all materials necessary for complete and operating electrical systems.
- D. Contractor shall inspect the site and verify all measurements and conditions. No extra compensation will be allowed because of differences between work shown on the drawings and measurements at the site.
 - 1. The Drawings are diagrammatic in nature, but the locations of devices, equipment, outlets, and lighting fixtures are shown approximately where installations are intended. Architectural, structural, mechanical, audio/video, theatrical lighting and other drawings shall be examined, noting all conditions that may affect this work. Report conflicting conditions to the Architect/Engineer for adjustment before proceeding with the work. Should the Contractor proceed with work without reporting the matter, he does so on his own responsibility and shall alter work if directed by the Architect/Engineer at his own expense.
- E. Examine the architectural, structural, mechanical, fire sprinkler and manufacturer's drawings for various equipment in order to determine exact routing and final terminations for all conduits and cables. Conduits shall be stubbed up as near as possible to equipment enclosure.
- F. All equipment shall be located and installed so that it will be readily accessible for operation and maintenance. The Owner reserves the right to require minor changes in location of outlets or equipment, prior to rough in without incurring any additional cost or changes.
- G. If significant departures from the Drawings or Specifications are considered necessary by the Contractor, details of the changes and the reasons therefore shall be submitted to the Architect as within thirty days after award of contract. Prior written acceptance of the Architect is required for these departures.
- H. Clarification of plans and specifications for the purpose of facilitating construction, but not involving additional labor and materials, may be prepared during construction by the Architect/Engineer. Said revised plans and specifications shall become a part of the contract. The Contractor shall conform to the revised plans and specifications at no additional cost to the District.

1.6 CODES, STANDARDS, RULES AND REGULATIONS

- A. All work and materials shall be in full accordance with the latest rules, codes, and/or regulations and not limited to the following:
- B. (CEC) - 2019 Edition
- C. NFPA 101 - Life Safety Code
- D. NFPA 72 - Fire Alarm Code

- E. Title 24 - State of California Administrative Code
- F. Uniform Building Code (UBC) OR California Building Code (CBC)
- G. City or County Electrical Code as applicable.
- H. Utility rules and regulations.
- I. Any applicable additional codes and regulatory documents effective at the project site.
- J. Nothing on the Drawings or in the Specifications shall be construed to allow work not in conformance with these rules, codes, and regulations.
 - 1. The Drawings and/or Specifications shall take precedence where work and material described therein exceeds that required by rules, codes, or regulations.

1.7 MANUFACTURER'S INSTRUCTIONS

- A. Follow the manufacturer's instructions when specific installation or connection details are not indicated or specified on the contract documents.
- B. Notify the Architect/Engineer of conflicts between the manufacturer's instructions and installation or connection details prior to the installation of materials.

1.8 WORKMANSHIP

- A. High quality workmanship shall be evidenced in the installation of all electrical equipment and materials. Use the National Electrical Contractors Association's "Standard of Installation" as a guide to the workmanship required. Be prepared to replace or repair any material or equipment damaged by or installed in a manner exhibiting evidence of poor workmanship.

1.9 COORDINATION WITH OTHER TRADES

- A. Examine the Electrical Drawings and refer to the Drawings and Specifications describing other work to be accomplished. Verify and coordinate prior to bid. Continue to coordinate work planning and all work in the field to avoid conflicts, errors, and/or delays. No compensation will be allowed for extra work necessitated by lack of coordination.

1.10 AUTHORITY OF THE ARCHITECT

- A. As used in this paragraph only, the word "Architect" shall mean the Architect of record or his designated representative.
- B. The authority of the Architect shall be absolute with respect to all performance under this Specification. In case of dispute, the decision of the Architect shall be final.
- C. Where optional materials, methods, or installation techniques are allowed under the provisions of this Specification, they may be used at the discretion of the Architect. The Architect may require specific materials, methods, or techniques to be used in specific situations where use of other materials,

methods, or techniques might in his judgment result in loss of aesthetics, accidental damage, life safety hazard, or loss of utility over the system design lifetime.

- D. No additional charges will be allowed for work or material require to be supplied under the conditions of this paragraph unless the need for such material or work could not have been anticipated by thorough study of the site, Drawings, and Specifications and knowledge of all applicable codes, laws, and ordinances.

1.11 EXAMINATION OF THE SITE

- A. The contractor is required to visit the site of construction prior to bid to determine existing conditions and their effect upon the work he will be required to perform. No additional compensation will be allowed for any extra expenses incurred by failure to detect and evaluate all existing conditions that will affect his work to be included in the bid to accomplish this contract document's goal.

1.12 STRUCTURAL REQUIREMENTS:

- A. Secure all anchors for electrical equipment in a manner, which will not decrease the structural value of any structure to an unsafe level. Install all equipment, fixtures, etc. to resist seismic movements. Inform the Architect in advance and provide drawings of any proposed modifications to the structure that involves cutting or patching of concrete, masonry, steel, or wood in this project.

1.13 PERMITS, FEES, AND, INSPECTIONS

- A. Obtain all permits and licenses as required and pay all fees incidental to construction.
- B. Inspections required by prevailing Local Authorities, and/or ordinances, shall be coordinated and arranged by the contractor. Provide the Architect with a schedule of inspections, where applicable, and submit all certificates of inspection to the Architect.
- C. The Contractor shall cooperate with the Architect and shall provide assistance at all times for the inspection of the electrical work. Remove covers, operate equipment, or perform any reasonable work, which, in the opinion of the Architect, will be necessary to determine the quality or adequacy of the work. Work shall not be closed in or covered before inspection and approval by the Architect. Cost of uncovering and making repairs where un-inspected work has been closed in shall be borne by the Contractor. If any material does not conform with these specifications the Contractor shall, within three days after being notified by the Architect, remove the materials from the premises.

1.14 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials and equipment to project site in manufacturer's original packaging with labeling showing product name, brand, model, project name, address, and Contractor's name. Store in a location as agreeable to District. Secure material from weather or accidental damage.

1.15 OPERATING INSTRUCTIONS

- A. Instruct the District as to function, operation, maintenance, and adjustment of each system and piece of equipment provided.

1.16 RECORD DRAWING

- A. The Contractor shall keep a separate set of Electrical Drawings at the job site to be used as RECORD Drawings. These Drawings are to be kept current and in a neat and clean condition at all times. They are to be available for inspection by the Architect or Engineer at any time during site visitations. These Drawings shall be "red lined" to indicate all changes in equipment, device, and outlet locations; and to indicate the true locations of all concealed or underground work where different from that shown on the Drawings. Each sheet of this set shall be clearly and permanently marked "RECORD DRAWINGS".
- B. Upon completion of the project and prior to final payment, transfer all RECORD DRAWINGS information to the provided original drawings. All information shall be clearly drawn with "RED" ink. The drawings shall be scanned, 100% edited, and converted into an AutoCAD ".dwg" version 2002 (or higher) electronic file. Deliver the original, final sets, and electronic files (CD) to the Architect for review and delivery to the District/Owner.

1.17 GUARANTEE

- A. All electrical work, material, and equipment shall be guaranteed to be free from defects in workmanship or material for a period of two (2) year from the date of final acceptance. Repair or replace all such defects in a timely manner and any damage to the owner's property resulting from such defect or repair thereof. All equipment and material provided and all work accomplished under the requirements of this section shall be at no expense to the District.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Unless specifically indicated otherwise, all material shall be new and free from defects; it shall be listed by Underwriters' Laboratories where applicable. Like items shall be of the same manufacturer (except lighting fixtures - which shall be as specified).
- B. Except as noted otherwise, where material of a particular manufacturer is specified, the intent is to describe the quality and function of the item. The term "...or acceptable equal" is implied. A substitution of any of these items will require that the item be presented in a submittal whether specifically listed in the "Submittals" paragraph below or not.

2.2 SUBMITTALS

- A. Material submittals shall be complete and submitted all at the same time. The individual groups of submittal types (e.g.: lighting fixtures, wiring devices, distribution equipment, etc.) MUST be prefaced with a list of contents identifying each item by its project name or symbol, manufacturer, and complete catalog number. Each copy of each submittal group shall have the list of contents attached. These lists will be used to report submittal comments. The Contractor is responsible for submitting this information in a timely manner so that material may be ordered early enough to meet the construction schedule. If material is not ordered in time for whatever reason, pay such premium prices and special handling charges as are required to meet the construction schedule. No substitution of an "accepted" item will be allowed due to failure to plan for adequate material procurement lead time.

- B. Shop drawings shall be drawn to scale or completely dimensioned and shall give all information required to completely describe the item. The Contractor shall carefully check all the shop drawings for compliance with these specifications and the Plans.
- C. If the shop drawings show variations from the Contract requirements because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in order that if (acceptable) suitable action may be taken for proper adjustment of the Contract. The Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract, even though the shop drawings have been reviewed.
- D. Work requiring shop drawings shall not be started before receipt of the Architect's review and acceptance.
- E. The Architect's/Engineer's review of the submitted materials, items and shop drawings are for general compliance with the plans and specifications and general design and arrangement only. Therefore, it shall not relieve the Contractor from responsibility for errors of any sort in the materials, items, shop drawings or schedules. The Contractor shall verify all dimensions and job site conditions affecting the work, and shall be responsible for furnishing and installing the proper materials required by the Contract, whether or not indicated on the drawings and specifications.
- F. As a minimum, submittals are required for the following items:
 - 1. RACEWAY COMPONENTS
 - 2. WIRE AND CABLE
 - 3. WIRING DEVICES
 - 4. MAIN SWITCHBOARD AND DISTRIBUTION PANELS
 - 5. PANELBOARDS
 - 6. PHOTOVOLTAIC SYSTEM
 - 7. PULL BOXES
 - 8. SAFETY SWITCHES, DISCONNECTS AND CIRCUIT BREAKERS
 - 9. TRANSFORMERS
 - 10. LIGHTING FIXTURES, CONTROL SYSTEMS, PEDESTALS AND POLES
 - 11. FIRE ALARM SYSTEM
 - 12. COMMUNICATIONS SYSTEM
 - 13. SECURITY SYSTEM
 - 14. DATA DISTRIBUTION SYSTEM
 - 15. TERMINAL CABINETS

2.3 SUBSTITUTIONS

- A. Specific brand names and catalog numbers are used to describe materials in order to establish of performance and quality.
- B. Only one substitution will be considered for any item. Substitute materials must be equal in quality and function to that specified. Allowance of a substitution does not permit any reduction of system performance or utility, and the Contractor is responsible for additional costs incurred due to use of a substituted item. If the proposed substitute item is "rejected", the specified item shall be provided (re-submittal required) without further discussions or delay.
- C. Any Contractor's proposed substitution of material, article, or method in the opinion of the Architect/Engineer are equal to that specified will be accepted, provided the Contractor submits a single written request, in triplicate, to the Architect, with the following information for each item:
 - D. Name of Manufacturer or supplier.
 - E. Trade or brand names.
 - F. Type, model, style, and/or catalog number.
 - 1. Size or capacity rating.
- G. After receipt of a written request from the contractor, the engineer of record will review product substitutions fourteen (14) days prior to the bid date. If system substitutions are submitted after the award of the project contract, the analysis for the whole system substitution will be charged to the contractor at senior engineer hourly rates.
- H. The decision of the Architect/Engineer shall govern as to what is equal to the item specified in the plans and specifications. Equality will be judge on the basis of the following:
 - 1. Conformance with description or performance required.
 - 2. Equal in quality.
 - 3. Comparable in appearance and artistic effect where these are in considerations.
 - 4. Comparable operation, maintenance and performance.
 - 5. Equal in longevity and service under conditions of climate and usage.
 - 6. Conformance with space allocations and requirements for operations from in details and construction of related work.
 - 7. Conformance with all applicable codes and regulations.
- I. If the Architect/Engineer considers it necessary, tests to determine the quality of the proposed materials shall be made, at the expense of the Contractor, by an unbiased laboratory, satisfactory to the Architect.

2.4 ENCLOSURES

- A. Provide enclosures suitable for the specific type of location in which they are installed.
 - 1. Provide NEMA 1 or NEMA 12 boxes and enclosures for dry locations. Dry locations are all indoor areas that do not fall within the definitions below for wet or damp locations.
 - 2. Provide NEMA 3R boxes and enclosures for wet locations. Wet locations are all locations exposed to weather, whether under a roof or not.
 - 3. Provide NEMA 4 boxes and enclosures for damp locations. Damp locations are all indoor spaces wholly or partially underground or any area subject to water spray.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All equipment shall be set square and plumb, securely mounted, adequately supported, and permanent. Provide workspace around items of electrical equipment as required by California Electrical Code (CEC). In general, equipment is to be installed in accordance with manufacturer's instructions; but the requirements of these specifications shall take precedence where conflicts exist.
- B. WIRING METHODS: The cables and conductors of all systems specified in the Specification are required to be installed in raceway.

3.2 ELECTRICAL WORK FOR EQUIPMENT PROVIDED UNDER OTHER SECTIONS

- A. Install power conductors and terminate on equipment provided under other specification sections. Verify specific requirements.
- B. Install and terminate electrical controls as described on the Electrical Drawings (For mechanical equipment specified in Division 23).
- C. Line voltage control wiring of exhaust fans is to be accomplished under this Division. The controlling device may be specified elsewhere.
- D. Provide and install all disconnect/safety switches and motor starters except those devices specified to be furnished with equipment specified elsewhere.
- E. Unless provided for in another Division, install all items of electrical equipment provided by others.
- F. Assist others in equipment testing to verify that wiring and connections made under this Division are correct.

3.3 EQUIPMENT IDENTIFICATION

- A. Nameplates shall be installed on all items of electrical equipment as follows: switchboard(s) and switchboard circuit breakers, panelboards, terminal cabinets, time switches, contactors, motor control switches, wall switches (where noted on the Drawings), motor starters provided under this Division where the function is not immediately obvious, and safety switches.

- B. The nameplate shall identify the item by Drawing name where applicable and describe its use or function in this installation.
- C. Permanently mark all utility outlets to show source of power panel and circuit breaker number.

3.4 EXCAVATION AND BACKFILL

- A. Excavation and backfill shall be accomplished as required for installation of electrical equipment as shown on the Drawings. Restore all surfaces, roadways, walks, etc., and any existing underground structures which might be disturbed during this work to their original condition in a manner acceptable to the Architect.
- B. Trenches shall be straight except where otherwise indicated. Depth shall be as noted on the Drawings and at least as required to provide the minimum cover specified by applicable codes and regulations for the equipment installed. Bottom of trench shall be smooth and free of any rock points. Place a 4" sand bed in trench if these conditions cannot be met with native material.
- C. Backfill shall be clean and free of rocks and debris. Backfill is to be tamped in 6" layers to nominal 95% compaction using a mechanical tamper manufactured specifically for this purpose. In an area of engineered fill or other area of specified compaction, backfill shall be compacted to match that specified for that area.
- D. At a depth of 12" below finished grade and at least 6" above installed equipment, lay a 6" wide yellow warning tape on the compacted backfill for the full length of the trench. Do not stretch the tape. Use Brady "Identoline" stating: "CAUTION BURIED ELECTRICAL LINE". Installation under building slabs is not required unless noted otherwise.
- E. If at any time during a period of one-year dating from the date of final acceptance of the project, there shall be any settlement of conduit trenches, the Architect may notify the Contractor to immediately provide additional fill and to make such repairs or replacements in paving, planting, or structures, as may be deemed necessary at the Contractor's expense
- F. Cooperate and coordinate with others in planning for and execution of all trench work.
 - 1. The Contractor is expected to exercise due care when excavating in an area of existing utilities to avoid damage to these facilities. Where it can be determined that underground facilities are likely to exist (either from the Drawings or inspection of the site), the Contractor is required to determine the exact locations of these existing installations. Damage to existing facilities, due to failure to properly accomplish the above, shall be repaired at the Contractors expense to the approval by the Architect and satisfaction of the District.
 - 2. CALL AN UNDERGROUND SERVICE FIRM BEFORE TRENCHING, CALL U.S.A. (800) 624-2444.

3.5 SEALING PENETRATIONS

- A. Flash and counter flash roof and wall penetrations with equipment manufactured for the purpose and as described in other Divisions of these Specifications or as Directed by the Architect. Apply mastic as required to seal absolutely watertight.

- B. Conduits penetrating floor slabs or block or concrete walls shall be grouted and sealed watertight.

3.6 CUTTING AND PATCHING

- A. Obtain the Architect's acceptance prior to cutting existing surfaces or surfaces under construction. All such surfaces must be repaired or patched to the satisfaction of the Architect.

3.7 EQUIPMENT ANCHORING

- A. Seismic Withstand Requirements: Freestanding or wall-hung equipment shall be anchored in place by methods, which will meet the requirements of the Archaic for seismic loads.
- B. Seismic bracing for light fixtures cable or pendant suspended from ceiling or roof structure shall be seismically braced to prevent fixture from swaying 45 degree in either direction of suspension point. Contractor shall use same cable used to suspend light fixture. Where pendants are use the contractor shall use aircraft light fixture suspension cable. Submittal shall include data on attachment hardware and methods that will satisfy withstand criteria referred to in above paragraph.

3.8 PROTECTION CLEANING AND REPAIRS

- A. All electrical equipment shall be protected from damage or degradation during construction. Electrical equipment stored or installed shall be protected from dust, water, or damage from other sources.
- B. After all other work has been accomplished, such as plastering, painting, etc., and prior to final review by the Architect; all electrical equipment, especially equipment enclosures, panelboards, switchboards, and lighting fixtures shall be thoroughly cleaned (inside and out) of all dirt, water, grease, plaster, paint, or other construction debris. All surfaces shall be clean and in "new" condition. All scratches, dents, marks, cracks, etc., shall be repaired to the satisfaction of the Architect or the equipment shall be replaced at no additional cost.

3.9 ELECTRICAL EQUIPMENT DELIVERABLES

- A. Retain and safeguard all detachable and spare devices, equipment, and literature (O&M manuals, instruction books, wiring diagrams, test reports, keys, fixtures, etc.) until completion of work. At this time, all items will be delivered to the District as directed by the Architect.

3.10 TESTS

- A. Prior to energization of equipment, check the insulation resistance of listed circuits, with a 500 volt "Megger".
- B. Take precaution during the testing period to insure the safety of personnel and equipment.
- C. Test all wiring for continuity and grounds before any fixtures or equipment are connected. Where such tests indicate faulty installation or other defects, the fault(s) shall be located and repaired at the Contractor's expense. The repaired installation shall then be retested.
- D. Verify rotation of all three phase motors and reconnect if necessary.

- E. Verify the resistance of the grounding electrode system(s).
- F. Balance all loads on each panelboard and all other types of distribution equipment as applicable.

END OF SECTION 26 01 10

SECTION 26 02 10
ELECTRICAL DEMOLITION GENERAL REQUIREMENTS

PART 1 – GENERAL

1.1 CONTRACT PROVISIONS

- A. The requirements of this Section are in addition to the requirements of Division 1, General Conditions and Supplementary Conditions.

1.2 RELATED DOCUMENTS

- A. Section 260110- General Requirements, Electrical.
- B. Notes and requirements on drawings.

1.3 REQUIREMENTS INCLUDED

- A. The Contractor shall furnish materials, equipment, and labor necessary to perform and complete demolition work.
- B. The work includes demolition of the existing electrical and fire alarm work.
- C. The work shall include, but not limited to, removal of existing electrical and fire alarm equipment and devices, conduits, and wiring.
- D. Manufactured articles, materials, equipment, and accessories shall be demolished in accordance with the manufacturer's specifications and recommendations, and industry standards.
- E. Notify the District's (Owner) representative at least 72 hours prior to any electrical systems shutdown.

1.4 PROTECTION

- A. It is essential that there be minimal interruption of existing systems such as power, fire protection, and other systems, in addition to the normal operations of the District's (Owner) facilities.
- B. Take care to ensure that there will be no damage to structural elements or portions there-of-which are not to be removed. Erect and maintain temporary shoring, bracing, and other means to safeguard the structural integrity of the existing buildings and structures.
- C. Erect and maintain temporary bracing, shoring, lights, barricades, signs, and other means to protect the public, workers, and other persons; finishes and improvements to remain; and adjoining property from damage from demolition work; all in accordance with application regulatory requirements.
- D. Protect existing structures, facilities, and plant life from damage. Items damaged as a result of demolition operations shall be repaired or replaced, at no cost to the District (Owner).
- E. Perform demolition to provide the least interference and most protection to existing facilities and improvements to remain.
- F. Demolish concrete in small sections.
- G. Perform demolition as much as possible with small tools.
- H. Jack-hammering:

1. Jack-hammering will be permitted only to a limited degree, and only with the prior written approval of the Owner.
2. Do not jackhammer within 2-inches of reinforcing or structural steel to remain; remove final 2-inches of material with chipping gun.

1.5 CUTTING AND PATCHING

- A. Make new openings neat, as close as possible to profiles indicated, and only to extent necessary for new work.
- B. Do not cut or alter structural members unless specifically indicated or approved, and do not damage reinforcing or structural steel to remain.
- C. At concrete, masonry, paving, and other materials where edges of cuts and holes will remain exposed in the completed work, make cuts using power-sawing and coring equipment. Do not over cut at corners of cut openings – saw overruns will not be permitted. Core hole at corner of proposed openings to insert blade and chip square.
- D. Upon completion of cutting and coring, clean remaining surfaces of loose particles and dust.
- E. Repair and patch all holes and openings from the removed electrical equipment, outlet boxes, etc. Coordinate with the General Contractor and the Architect to include and provide finished to match adjacent area.

1.6 PIPES, DUCTS, AND CONDUITS

- A. Remove deactivated electrical conduit, including fastenings, connections, and other related appurtenances and accessories which would otherwise be exposed in the completed work or interfere with construction operations.
- B. Unless noted otherwise, remove existing exposed conduits and abandon existing concealed conduits in walls, ceiling and underground whether shown on drawings or not.
- C. Cap deactivated piping systems at points of cutoff.

1.7 DEMOLITION DEBRIS

- A. All equipment and associated materials must be disposed of in an approved manner and in accordance with all applicable federal, state, and local environmental laws.
- B. Regularly remove debris from the site so that it's presence will not delay the progress of the work.
- C. Nothing to be removed from the site shall be stored, sold, or burned on the site without the District/Owner's prior written acceptance.

1.8 RECONDITIONING EXISTING SUBSTRATES

- A. Clean surfaces on which new materials will be applied, removing adhesives, bitumen, and other adhering materials, as necessary to furnish acceptable substrates for new materials.
- B. Perform sandblasting, chipping, grinding, acid washing, etching, and other work as required by conditions encountered and new materials involved
- C. Use of acids or other cleaning agents shall include neutralizing, washing, rinsing, and drying, as applicable.

- D. Determine substrate requirements for reconditions surfaces in cooperation with the manufacturers representative and installer of each new installer involved.
- E. Clean surfaces on which new materials will be applied, removing adhesives, bitumen, and other adhering materials, as necessary to furnish acceptable substrates for new materials.

1.9 DISPOSAL OF FLUORESCENT LAMPS AND BALLASTS

- A. All existing fluorescent lamps and ballasts shall be properly disposed or recycled according to the Environmental Protection Agency (EPA) and Resource Conservation and Recovery Act (RCTA) standards. Include all costs for disposal or recycling in the bid proposal.
 - 1. Lamps: Dispose or recycle through “Allied Technology Group”, 47375 Freemont Boulevard, Fremont, California, 94538, (510) 490-3008 or equal.
 - 2. Ballasts: Dispose or recycle through “Fulcircle Ballast Recyclers”, 550 Montori Court, Pleasanton, California, 94556, (510) 417-5967 or equal.

1.10 ASBESTOS

- A. In the event asbestos is found to be present in areas conflicting with electrical work, before continuation of work in those areas, notify the General Contractor and/or District (Owner) representative and if applicable, for the removal of such hazardous material by a certified asbestos contractor.

END OF SECTION 26 02 10

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 V AND LESS)

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wire and cable for 600 volts and less.
- B. Wiring connectors and connections.

1.2 RELATED REQUIREMENTS

- A. Section 312000 - Earth Moving.
- B. Section 312219 - Finish Grading.
- C. Section 312333 - Trenching and Backfilling.
- D. Section 260553 - Identification for Electrical Systems.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- C. National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.4 SUBMITTALS

- A. See Section 013300 - Submittals.
- B. Product Data: Provide for each cable assembly type.
- C. Test Reports: Indicate procedures and values obtained.
- D. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency.
- F. Project Record Documents: Record actual locations of components and circuits.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 WIRING REQUIREMENTS

- A. Concealed Dry Interior Locations: Use only building wire in raceway.
- B. Exposed Dry Interior Locations: Use only building wire in raceway.
- C. Above Accessible Ceilings: Use only building wire in raceway.
- D. Wet or Damp Interior Locations: Use only building wire with Type insulation in raceway.
- E. Exterior Locations: Use only building wire with Type THWN insulation in raceway.
- F. Underground Installations: Use only building wire with Type THWN insulation in raceway.
- G. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- H. Use stranded conductors for control circuits.
- I. Use conductor not smaller than 12 AWG for power and lighting circuits.
- J. Use conductor not smaller than 16 AWG for control circuits.
- K. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- L. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
- M. Conductor sizes are based on copper unless indicated as aluminum or "AL".

2.2 WIRE MANUFACTURERS (LISTED IN ALPHABETICALLY ORDER ONLY AND NOT NECESSARY BY PREFERENCE)

- A. Cerro Wire Inc: www.cerrowire.com.
- B. Industrial Wire & Cable, Inc: www.iewc.com.
- C. Southwire Company: www.southwire.com.

D. Or Equal.

E. Substitutions: See Section 016000 - Product Requirements.

2.3 BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor: Copper.

1. For Sizes Smaller Than 4 AWG: Copper.

2. For Sizes 4 AWG and Larger: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: CEC 2019, Type THW.

2.4 SERVICE ENTRANCE CABLE

A. Description: CEC 2019, Type SE.

B. Conductor: Copper.

1. For Sizes Smaller Than 4 AWG: Copper.

2. For Sizes 4 AWG and Larger: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: Type RH.

2.5 WIRING CONNECTORS

A. Solderless Pressure Connectors:

B. Compression Connectors:

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire and cable has been completed.

C. Verify that raceway installation is complete and supported.

- D. Verify that field measurements are as indicated.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA.
- B. Route wire and cable as required to meet project conditions.
 - 1. Wire and cable routing indicated is approximate unless dimensioned.
 - 2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
 - 3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.
- C. Use wiring methods indicated.
- D. Pull all conductors into raceway at same time.
- E. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- F. Protect exposed cable from damage.
- G. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
- H. Use suitable cable fittings and connectors.
- I. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- J. Clean conductor surfaces before installing lugs and connectors.
- K. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- L. Where aluminum conductors are allowed for use as indicated on plans, terminate aluminum conductors with tin-plated aluminum-bodied compression connectors only. Fill with antioxidant compound before installing conductor.
- M. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- N. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

- O. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- P. Trench and backfill for direct burial cable installation as specified in Sections 312316 and 31 2323. Install warning tape along entire length of direct burial cable, within 3 inches of grade, as specified in Section 260553.
- Q. Identify and color code wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated.

3.4 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 014000.
- B. Inspect and test in accordance with NETA STD ATS, except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION 260519

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Grounding and bonding components.
- B. Provide all components necessary to complete the grounding system(s) consisting of:
 - 1. Existing metal underground water pipe.
 - 2. Metal underground water pipe.
 - 3. Metal frame of the building.
 - 4. Steel water storage tank and supports.
 - 5. Concrete-encased electrode.
 - 6. Ground ring specified in Section 337900.
 - 7. Existing metal underground gas piping system.
 - 8. Metal underground gas piping system.

1.2 RELATED REQUIREMENTS

- A. Section 032100 Reinforcing Steel.
- B. Section 033000 - Cast-in-Place Concrete

1.3 REFERENCE STANDARDS

- A. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- B. National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.4 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide for grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Project Record Documents: Record actual locations of components and grounding electrodes.
- F. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience with service facilities within 100 miles of Project.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Cooper Power Systems: www.cooperpower.com.
- B. Framatome Connectors International: www.fciconnect.com.
- C. Or Equal.
- D. Substitutions: See Section 01 25 13 Product Options and Substitutions.

2.2 ELECTRODES

- A. Manufacturers:
 - 1. Cooper Power Systems: www.cooperpower.com.
 - 2. Framatome Connectors International: www.fciconnect.com.
 - 3. Or Equal..

- 4. Substitutions: See Section 016000 - Product Requirements.
- B. Rod Electrodes: Copper.
 - 1. Diameter: 3/4 inch.
 - 2. Length: 10 feet.
- C. Foundation Electrodes: 2/0 AWG. unless noted on plan.

2.3 CONNECTORS AND ACCESSORIES

- A. Mechanical Connectors: Bronze.
- B. Exothermic Connections:
- C. Wire: Stranded copper.
- D. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.
- E. Grounding Well:
 - 1. Well Pipe: 8 inch by 24 inch long clay tile pipe with belled end.
 - 2. Well Cover: Cast iron with legend "GROUND" embossed on cover.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.2 INSTALLATION

- A. Install ground electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.
- B. Provide grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.
- C. Install 4 AWG bare copper wire in foundation footing where indicated.
- D. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing where indicated. Bond steel together.
- E. Provide bonding to meet requirements described in Quality Assurance.

- F. Provide isolated grounding conductor for circuits supplying personal computers and applicable electronic equipment.
- G. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.3 FIELD QUALITY CONTROL

- A. Provide Quality Control in accordance with Section 014500.
- B. Inspect and test in accordance with NETA STD ATS except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.13.

END OF SECTION 26 05 26

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Conduit and equipment support.
- B. Anchors and fasteners.

1.2 REFERENCE STANDARDS

- A. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2009.
- B. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2006
- C. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2010
- D. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2009.
- E. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- F. National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS (LISTED IN ALPHABETICALLY ORDER ONLY AND NOT NECESSARY BY PREFERENCE)

- A. Thomas & Betts Corporation: www.tnb.com.
- B. Threaded Rod Company: www.threadedrod.com.
- C. Or Equal.
- D. Substitutions: See Section 01 25 13 - Product Requirements.

2.2 SUPPORTS

- A. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. The pipe ring shall be malleable iron, split and hinged, or shall be springable wrought steel. Rings shall be bolted to or interlocked with the suspension rod socket.
- B. Pipe racks for groups of parallel conduits shall be constructed of galvanized structural steel preformed channels of length as required, suspended on threaded rods and secured thereto with nuts above and below the cross bar.
- C. Factory made pipe straps shall be one-hole malleable iron or two-hole galvanized clamps.
- D. Supporting rods shall be at least 3/8" diameter and channel shall be at least 3/4" deep. Supporting hardware shall be galvanized steel.

2.3 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
- D. Concrete Structural Elements: Use precast inserts, expansion anchors, powder-actuated anchors, or preset inserts.
- E. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
- F. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
- G. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
- H. Solid Masonry Walls: Use expansion anchors or preset inserts.
- I. Sheet Metal: Use sheet metal screws.

J. Wood Elements: Use wood screws.

K. Fastener Types:

1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
5. Other Types: As required.
6. Manufacturers:
 - a. Powers Fasteners, Inc: www.powers.com.
 - b. Or Equal.

L. Formed Steel Channel:

1. Manufacturer:
 - a. Unistrut
 - b. Cooper B-Line
 - c. Substitutions: See Section 01 25 13 - Product Requirements.

N. Powder-Actuated Anchors:

1. Manufacturer:
 - a. Ramset
 - b. Dewalt
 - c. Substitutions: See Section 01 25 13 - Product Requirements.

P. Steel Spring Clips:

1. Manufacturer:
 - a. Atkore
 - b. Eaton
 - c. Substitutions: See Section 01 25 13 - Product Requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
- B. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- C. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- D. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- E. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION 26 05 29

SECTION 26 05 30

ROOFTOP CONDUIT SUPPORT FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The work of this section consists of furnishing all labor, equipment, materials, and accessories, and performing all operations required for the correct installation of recycled rubber conduit and box supports for electrical conduit systems on roofs.

1.2 RELATED WORK

- A. See the following specification sections for work related to the work of this section:
1. 26 05 00 General Requirements for Electrical Systems
 2. 26 05 34 Electrical System Raceways and Fittings
 - a. Specifically note the requirements for:
 - 1) Galvanized rigid conduit
 - 2) Threaded fittings
 - 3) Erickson three-piece connectors.
 3. 26 05 37 Electrical System Junction and Pull Boxes
 4. General sections of the specifications and drawings for specific requirements associated with the roofing consultant.

1.3 STANDARDS AND CODES

- A. Work and material shall be in compliance with and according to the requirements of the latest revision of the following standards and codes:
1. Current Edition of California Electrical Code (CEC), National Electrical Code (NFPA 70) and / or local codes and modifications as applicable
 2. Underwriters Laboratories (UL)
 3. ASTM A653 G90 SS Gr.33 – Specification for Sheet Steel, Zinc coated (Galvanized) by the hot dipped process

4. ASTM B633 – Specification for Electrodeposited coatings of Zinc on Iron and steel
5. ASTM D412 – Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
6. ASTM D 395 – Test Methods for Rubber Property – Compression Set
7. ASTM D573 – Test Method for Rubber – Deterioration in an Air Oven
8. ASTM D746 – Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
9. ASTM D2240 – Test Method for Rubber Property – Durometer Hardness

1.4 SUBMITTALS

- A. As specified in Division 1.
- B. Catalog Data: Provide manufacturer’s descriptive literature.

PART 2 - PRODUCTS

2.1 ROOF CONDUIT SUPPORT SYSTEM

- A. Curb base must be made of 100% recycled rubber and polyurethane prepolymer with a support capacity of 2500 pounds per linear foot of support.
- B. Each base to have a reflective yellow stripe.
- C. Dimensions are to be six inches wide by height and width as required.
- D. Steel frame is to be 14 gauge galvanized for D and CE series and 12-gauge strut galvanized for CB and CS series.
- E. Attaching hardware is to be zinc plated threaded rod, nuts and attaching hardware per ASTM B633.
- F. Manufacturer: B-Line C-Port series or approved equal.

2.2 CONDUIT CLAMPS ARE TO BE CHANNEL STYLE SIMILAR TO GALVANIZED B-LINE B2000 SERIES

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer’s instructions and recommendations.

- B. Install after coordination with the roofing contractor such that the roofing contractor's guarantee is maintained.
- C. Attach to roof as per roofing contractor's instructions.
- D. Space conduit and box supports in accordance with appropriate electrical codes.
- E. Utilize CE series supports for conduit where CS supports are used for boxes so as to avoid offsets and unions where possible.

END OF SECTION 26 05 30

SECTION 26 05 34

RACEWAY

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Conduit, fittings and conduit bodies.

1.2 RELATED REQUIREMENTS

- A. Section 07 84 13 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260553 - Identification for Electrical Systems.
- E. Section 260537 - Boxes.
- F. The requirements of the kitchen equipment consultant plans and specifications.

1.3 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC); 2005.
- D. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- E. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.
- G. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association; 2005.

- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit; National Electrical Manufacturers Association; 2003.
- I. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2004.
- J. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, fittings, and conduit bodies.
- C. Project Record Documents: Accurately record actual routing of conduits larger than 1 1/4 inches.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept conduit on site. Inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Conduit Size: Comply with CEC 2019.
 - 1. Minimum Size: 3/4 inch unless otherwise specified.
- B. Underground Installations:
 - 1. More than 5 Feet from Foundation Wall: Use plastic coated conduit or thickwall non-metallic conduit.

2. Within 5 Feet from Foundation Wall: Use rigid steel conduit.
 3. In or Under Slab on Grade: Use plastic coated conduit or thickwall non-metallic conduit.
 4. Minimum Size: 1 inch.
- C. Outdoor Locations Above Grade: Use rigid steel conduit or intermediate metal conduit.
- D. In Slab Above Grade:
1. Use intermediate metal conduit or thickwall nonmetallic conduit.
 2. Maximum Size Conduit in Slab: 3/4 inch; 1/2 inch for conduits crossing each other.
- E. Wet and Damp Locations: Use rigid steel conduit or intermediate metal conduit.
- F. Dry Locations:
1. Concealed: Use electrical metallic tubing.
 2. Exposed: Use rigid steel conduit or intermediate metal conduit for installation up to 8 feet.

2.2 METAL CONDUIT

- A. Manufacturers:
1. Allied Tube & Conduit: www.alliedtube.com.
 2. Beck Manufacturing, Inc: www.beckmfg.com.
 3. Wheatland Tube Company: www.wheatland.com.
 4. Or Equal.
 5. Substitutions: See Section 01 25 13 - Product Requirements.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Intermediate Metal Conduit (IMC): Rigid steel.
- D. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.3 PVC COATED METAL CONDUIT

- A. Manufacturers:
1. Allied Tube & Conduit: www.alliedtube.com.
 2. Thomas & Betts Corporation: www.tnb.com.

3. Robroy Industries: www.robroy.com.
4. Or Equal.
5. Substitutions: See Section 016000 - Product Requirements.

B. Description: NEMA RN 1; rigid steel conduit with external PVC coating.

C. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.4 FLEXIBLE METAL CONDUIT

A. Manufacturers:

1. AFC Cable Systems, Inc: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.
4. Or Equal.
5. Substitutions: See Section 01 25 13 - Product Requirements.

B. Description: Interlocked steel construction.

C. Fittings: NEMA FB 1.

2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Manufacturers:

1. AFC Cable Systems, Inc: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.
4. Or Equal.
5. Substitutions: See Section 01 25 13 - Product Requirements.

B. Description: Interlocked steel construction with PVC jacket.

C. Fittings: NEMA FB 1.

2.6 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:

1. Allied Tube & Conduit: www.alliedtube.com.
 2. Beck Manufacturing, Inc: www.beckmfg.com.
 3. Wheatland Tube Company: www.wheatland.com.
 4. Or Equal.
- B. Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron compression type.

2.7 NONMETALLIC TUBING SHALL NOT BE USED FOR THIS PROJECT, NO EXCEPTIONS.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.2 INSTALLATION

- A. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install steel conduit as specified in NECA 101.
- C. All conduits shall be run concealed in walls and/or ceiling. Where conduits can not be run concealed in wall and/or ceiling space, the Contractor shall coordinate with the architectural and structural plans and the Architect for installing and routing of exposed conduits.
- D. Arrange supports to prevent misalignment during wiring installation.
- E. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- F. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- G. Fasten conduit supports to building structure and surfaces under provisions of Section 260529.
- H. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- I. Do not attach conduit to ceiling support wires.

- J. Arrange conduit to maintain headroom and present neat appearance.
- K. Route exposed conduit parallel and perpendicular to walls.
- L. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- M. Route conduit in and under slab from point-to-point.
- N. Do not cross conduits in slab.
- O. Maintain adequate clearance between conduit and piping.
- P. Cut conduit square using saw or pipecutter; de-burr cut ends.
- Q. Bring conduit to shoulder of fittings; fasten securely.
- R. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- S. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.
- T. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch size.
- U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- V. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic.
- W. Provide suitable pull string in each empty conduit except sleeves and nipples.
- X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Y. Ground and bond conduit under provisions of Section 260526.
- Z. Identify conduit under provisions of Section 260553.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

END OF SECTION 26 05 34

SECTION 26 05 37

BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Floor boxes.
- C. Pull and junction boxes.

1.2 RELATED REQUIREMENTS

- A. Section 07 84 13 - Firestopping.
- B. Section 262716 - Electrical Cabinets and Enclosures.
- C. Section 262726 - Wiring Devices: Wall plates in finished areas.
- D. The requirements of the kitchen equipment consultant plans and specifications.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.
- C. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Appleton Electric: www.appletonelec.com.
- B. Arc-Co./Division of Arcade Technology; www.arc-co.com.
- C. Unity Manufacturing: www.unitymfg.com.
- D. Or Equal.
- E. Substitutions: See Section 01 25 13 - Product Requirements.

2.2 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Wall Plates for Finished Areas: As specified in Section 262726.

2.3 FLOOR BOXES

- A. Floor Boxes: NEMA OS 1, fully adjustable, 1-1/2 inches deep.
- B. Material: Cast metal.
- C. Shape: Round.
- D. Service Fittings: As specified in Section 262726.

2.4 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 262716.

- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- D. In-Ground Cast Metal Box: NEMA 250, Type 6, outside flanged, recessed cover box for flush mounting:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Smooth cover with neoprene gasket and stainless steel cover screws.
 - 3. Cover Legend: "ELECTRIC".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify locations of floor boxes and outlets prior to rough-in.
- B. Verify locations of all boxes required for kitchen equipment with kitchen consultant plans and specifications.

3.2 INSTALLATION

- A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by CEC 2019.
- C. Coordinate installation of outlet boxes for equipment connected under Section 262717.
- D. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- E. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
 - 1. Adjust box locations up to 10 feet if required to accommodate intended purpose.
- F. Orient boxes to accommodate wiring devices oriented as specified in Section 262726.
- G. Maintain headroom and present neat mechanical appearance.
- H. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- I. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

- J. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- K. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- L. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- M. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- N. Use flush mounting outlet box in finished areas.
- O. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- P. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in fire-rated and acoustic rated walls.
- Q. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- R. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- S. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- T. Use adjustable steel channel fasteners for hung ceiling outlet box.
- U. Do not fasten boxes to ceiling support wires.
- V. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- W. Use gang box where more than one device is mounted together. Do not use sectional box.
- X. Use gang box with plaster ring for single device outlets.
- Y. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- Z. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.
- AA. Set floor boxes level.
- AB. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

3.3 ADJUSTING

- A. Adjust floor boxes flush with finish flooring material.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.

- C. Install knockout closures in unused box openings.

3.4 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION 26 05 37

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.
- D. Field-painted identification of conduit.

1.2 RELATED REQUIREMENTS

- A. Section 09 91 00 - Painting and Coating.

1.3 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements for submittals procedures.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Buried Electrical Lines: Underground warning tapes.
- B. Communication Cabinets: Nameplates.

- C. Conduit: Conduit markers.
- D. Control Device Station: Labels.
- E. Electrical Distribution and Control Equipment Enclosures: Nameplates.

2.2 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Seton Identification Products: www.seton.com/aec.
- C. HellermannTyton: www.hellermanntyton.com.
- D. Or equal.
- E. Substitutions: See Section 01 25 13 - Product Requirements.

2.3 NAMEPLATES AND LABELS

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co.; www.kolbipipemarkers.com.
 - 2. Seton Identification Products; www.seton.com.
 - 3. Or Equal.
- B. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- C. Locations:
 - 1. Each electrical distribution and control equipment enclosure.
 - 2. Communication cabinets.
- D. Letter Size:
 - 1. Use 1/8 inch letters for identifying individual equipment and loads.
 - 2. Use 1/4 inch letters for identifying grouped equipment and loads.
- E. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, and control device stations

2.4 WIRE MARKERS

- A. Manufacturers:

1. Brady Corporation; www.bradycorp.com.
 2. Seton Identification Products; www.seton.com.
 3. HellermannTyton; www.hellermanntyton.com.
 4. Or Equal.
- B. Description: Vinyl cloth type self-adhesive wire markers.
- C. Description: Cloth type wire markers.
- D. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection.
- E. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
 2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings.

2.5 CONDUIT MARKERS

- A. Manufacturers:
1. Brady Corporation; www.bradycorp.com.
 2. Seton Identification Products; www.seton.com.
 3. HellermannTyton; www.hellermanntyton.com.
 4. Or Equal.
- B. Location: Furnish markers for each conduit longer than 6 feet.
- C. Spacing: 20 feet on center.
- D. Color:
1. Fire Alarm System: Red.

2.6 UNDERGROUND WARNING TAPE

- A. Manufacturers:
1. Brady Corporation; www.bradycorp.com.
 2. Seton Identification Products; www.seton.com.

3. HellermannTyton; www.hellermanntyton.com.
 4. Or Equal.
- B. Description: 3 inch wide polyethylene tape, detectable type colored red with suitable warning legend describing buried electrical lines.
 - C. Description: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.2 INSTALLATION

- A. Install nameplates and labels parallel to equipment lines.
- B. Secure nameplates to equipment front using screws.
- C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

END OF SECTION 26 05 53

SECTION 26 0800**ELECTRICAL COMMISSIONING REQUIREMENTS****PART 1 - GENERAL****1.01 DESCRIPTION**

- A. The purpose of this section is to specify the Contractor's responsibilities and participation in the commissioning process relative to division 26.
- B. The commissioning process is primarily the responsibility of the Commissioning Authority, with support for start-up, testing, and commissioning the responsibility of the Contractors. The commissioning process does not relieve the Contractor from participation in the process, or diminish the role and obligations to complete all portions of work in a satisfactory and fully operational manner.
- C. Work of Division 26 includes:
 - 1. Testing and start-up of the electrical equipment.
 - 2. Providing qualified personnel to assist in commissioning tests to verify equipment/ system performance.
 - 3. Completion and endorsement of pre-functional test checklists provided by the Commissioning Authority to assure that Division 26 equipment and systems are fully operational and ready for functional testing.
 - 4. Providing equipment, materials, and labor necessary to correct deficiencies found during the commissioning process which fulfill contract and warranty requirements.
 - 5. Providing training for the systems specified in Division 26 with coordination of owner by the Commissioning Authority.

1.02 RELATED WORK

- A. All testing and start-up procedures and documentation requirements specified within Division 26.
- B. Section 01 9100 – General Commissioning Requirements
- C. Commissioning functional test procedures that require participation of the Contractors.
- D. Cooperate with the Commissioning Authority in the following manner:
 - 1. Allow sufficient time before final completion dates so that testing can be accomplished.
 - 2. Provide labor and material to make corrections when required without undue delay.
 - 3. Coordinate all required support of that equipment which is provided to or installed with involvement of Division 23 contractors.

PART 2 - PRODUCTS**2.01 TEST EQUIPMENT**

- A. Standard certified test equipment for commissioning shall be provided by the Division 26 Contractor.

ELECTRICAL COMMISSIONING REQUIREMENTS

Page 2

- B. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Commissioning Authority in the commissioning process.

PART 3 - EXECUTION

3.01 WORK PRIOR TO COMMISSIONING

- A. Complete all phases of work so the system can be started, tested, balanced, and otherwise commissioned. Division 26 has temporary power and start-up responsibilities with obligations to complete systems, including all sub-systems so they are functional. This includes the complete installation of all equipment and materials per the contract documents and related directives, clarifications, change orders, etc.
- B. The Commissioning Authority will develop a Commissioning Plan. Upon request of the Commissioning Authority, the Contractor shall provide assistance and consultation. The Commissioning Plan will be developed prior to completion of the installation. The Contractor is obligated to assist the Commissioning Authority in preparing the Commissioning Plan by providing all necessary information pertaining to the actual equipment and installation.
- C. Specific pre-commissioning responsibilities of Division 26 are as follows:
 - 1. Normal start-up services required to bring each system into a fully operational state. The Commissioning Authority will not begin the commissioning process until each system is complete and documented, including normal contractor start-up.
 - 2. The Contractor shall perform pre-functional tests on the equipment and systems as noted in section 01 9100 General Commissioning Requirements.
 - 3. Contractor start-up forms may be substituted for the pre-functional test forms with prior approval by the Commissioning Authority.
 - 4. Pre-functional test forms will be kept in the Contractors job trailer in a Commissioning Field Notebook provided by the Commissioning Authority.
 - 5. Factory start-up services will be provided for key equipment and systems specified in Division 26. The Contractor shall coordinate this work with the manufacturer and the Commissioning Authority.
- D. Commissioning is intended to begin upon completion of a system. Commissioning may proceed prior to the completion of systems and/or sub-systems, if expediting this work is in the best interests of the Owner. Commissioning activities and schedule will be coordinated with the Contractor. Start of commissioning before system completion will not relieve the Contractor from completing those systems as per the schedule.
- E. The Field Commissioning Notebook will be used to identify and track all pertinent commissioning documentation required during the Installation phase. This Notebook will be assembled by the Commissioning Authority and maintained by the Contractor. The Notebook provides a central location for the Commissioning Authority to identify, copy and organize all pertinent information and will include the following format:
 - 1. Summary describing Notebook contents and use.
 - 2. Copy of Commissioning Plan for contractor field reference.

ELECTRICAL COMMISSIONING REQUIREMENTS

Page 3

3. Listing of all specification documentation requirements listed by specification section, with sign off spots for appropriate contractors.
4. Tabs for each specification section with copies of pre-functional test check sheets provided by coordination of subcontractors and Commissioning Authority for contractor completion and space for related contractor-supplied documents.
5. Prior to functional testing the Commissioning Authority will use this book to verify that all appropriate contractors have completed their work and signed off that they have done so. Once the Commissioning Authority is satisfied that all components of a system are complete functional testing will begin.

3.02 PARTICIPATION IN COMMISSIONING

- A. Provide skilled technicians to start up and debug all systems within the division of work. These same technicians shall be made available to assist the Commissioning Authority in completing the commissioning program as it relates to each system and their technical specialty. Work schedules, time required for testing, etc., will be requested by the Commissioning Authority and coordinated by the Contractor. Contractor will ensure the qualified technician(s) are available and present during the agreed-upon schedules and of sufficient duration to complete the necessary tests, adjustments, and/or problem resolutions.
- B. The Commissioning Authority reserves the right to judge the appropriateness and qualifications of the technicians relative to each item of equipment, system, and/or sub-system. Qualifications of technicians include expert knowledge relative to the specific equipment involved, adequate documentation and tools to service/commission the equipment, and an attitude/willingness to work with the Commissioning Authority to get the job done. A liaison or intermediary between the Commissioning Authority and qualified factory representatives does not constitute the availability of a qualified technician for purposes of this work.

3.03 WORK TO RESOLVE DEFICIENCIES

- A. Maladjustments, misapplied equipment, and/or deficient performance under varying loads will result in a system that does not meet the original design intent. Correction of work will be completed under the direction of the Architect, with input from the Contractor, equipment supplier, and Commissioning Authority. Whereas all members will have input and the opportunity to discuss, debate, and work out problems, the Architect/Engineer of Record will have final jurisdiction on the necessary work to be done to achieve performance and or design intent.

3.04 ADDITIONAL COMMISSIONING

- A. Additional commissioning activities may be required after system adjustments, replacements, etc., are completed. The Contractor, suppliers, and Commissioning Authority shall include a reasonable reserve to complete this work as part of their standard contractual obligations.

ELECTRICAL COMMISSIONING REQUIREMENTS

3.05 SEASONAL COMMISSIONING AND OCCUPANCY VARIATIONS

- A. Seasonal commissioning pertains to testing under full-load conditions during peak heating and peak cooling seasons, as well as part-load conditions in the spring and fall. Initial commissioning will be done as soon as contract work is completed regardless of season. Subsequent commissioning may be undertaken at any time thereafter to ascertain adequate performance during the different seasons.
- B. All equipment and systems will be tested and commissioned in a peak season to observe full-load performance. The Contractor will be responsible to participate in the initial and the alternate peak season test of the systems required to demonstrate performance.
- C. Subsequent commissioning may be required under conditions of minimum and/or maximum occupancy or use. All equipment and systems affected by occupancy variations will be tested and commissioned at the minimum and peak loads to observe system performance. The Contractor will be responsible to participate in the occupancy sensitive testing of systems to provide verification of adequate performance.

3.06 TRAINING

- A. The Contractor will be required to participate in the training of the Owner's engineering and maintenance staff for each mechanical system and the related components. Training may be conducted in a classroom setting, with system and component documentation, and suitable classroom training aids, or in the field with the specific equipment. The type of training will be per the Owner's option.
- B. Training will be conducted jointly with the Commissioning Authority, the design engineers, the equipment vendors, and the Contractor. The Contractor will be responsible for the generic training, as well as instructing the Owner's staff on the system peculiarities specific to this project.

3.07 SYSTEMS DOCUMENTATION

- A. Contract Documents to incorporate field changes and revisions to system designs to account for actual constructed configurations will be addressed as required in Division 1. All drawings should be red-lined on two sets. Division 26 as-built drawings should include updated architectural floor plans, and the individual electrical systems in relation to actual building layout.
- B. Maintain as-built red-lines on the job site as required in Division 1.
- C. In addition to the stated requirements for operation and maintenance data, provide one copy of equipment technical literature, operation and maintenance literature, and shop drawings to the Commissioning Authority as soon as they are available. This requirement is for review of these documents prior to distribution of multiple copies for the Owner's final use.

END OF SECTION

SECTION 26 09 16
ELECTRIC CONTROLS AND RELAYS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pushbutton and selector switches.
- B. Control stations and panels.
- C. Relays and time-delay relays.
- D. Control power transformers.

1.2 RELATED REQUIREMENTS

- A. Section 262716 - Electrical Cabinets and Enclosures: Cabinets and terminal blocks.

1.3 REFERENCE STANDARDS

- A. NEMA ICS 1 - Industrial Control and Systems: General Requirements; National Electrical Manufacturers Association; 2005 (R2008).
- B. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC; National Electrical Manufacturers Association; 2000 (R2005).
- C. NEMA ICS 6 - Industrial Control and Systems: Enclosures; National Electrical Manufacturers Association; 1993 (R2006).
- D. NEMA ST 1 - Specialty Transformers (Except General Purpose Type); National Electrical Manufacturers Association; 1988 (R1997).
- E. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Submit to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, dimensions, support points.
- C. Product Data: Provide for each component showing electrical characteristics and connection requirements.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Control Switches and Stations:
 - 1. Contacts: NEMA ICS 2, Form Z.
 - 2. Contact Ratings: NEMA ICS 2, A150.
 - 3. Selector Switch Operators: Two position rotary selector switch.
 - 4. Pushbutton Operator: Unguarded type.
 - 5. Control Stations: Standard duty oil tight type pushbutton station.
- B. Magnetic Control Relays: NEMA ICS 2, Class A300.
 - 1. Contacts: NEMA ICS 2, Form Z.
 - 2. Contact Ratings: NEMA ICS 2, Class A150.
 - 3. Coil Voltage: 120 volts, 60 Hz, AC.
- C. Solid-State Relays: NEMA ICS 2.
 - 1. Contacts: NEMA ICS 2, Form Z.
 - 2. Contact Ratings: NEMA ICS 2, Class A150.
 - 3. Coil Voltage: 120 volts, 60 Hz, AC.
- D. Time-Delay Relays: NEMA ICS 2, Class A600, pneumatic time-delay relay with 5 second time delay after energization.
 - 1. Contacts: NEMA ICS 2, Form Z.
 - 2. Contact Ratings: NEMA ICS 2, Class A150.
 - 3. Coil Voltage: 120 volts, 60 Hz, AC.
- E. Interval Timing Relays: NEMA ICS 2, Class A300, repeat cycle timer.

1. Contacts: NEMA ICS 2, Form Z.
 2. Contact Ratings: NEMA ICS 2, Class A150.
 3. Coil Voltage: 120 volts, 60 Hz, AC.
- F. Clock Timers: NEMA ICS 2, Class A300, 24-hour timer.
1. Astronomical dial.
 2. Contacts: NEMA ICS 2, Form Z.
 3. Contact Ratings: NEMA ICS 2, Class A150.
 4. Coil Voltage: 120 volts, 60 Hz, AC.
- G. Control Power Transformers: Machine tool transformer with isolated secondary winding.

2.2 ENCLOSURES

- A. Control Station Enclosures: NEMA ICS 6; Type 1.
- B. Relay Enclosures: NEMA ICS 6; Type 1.
- C. Fabrication: Shop fabricate control panels to NEMA ICS 1, using cabinets and terminal blocks furnished under the provisions of Section 262716.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install individual relays and time-delay relays in enclosures.
- C. Install cabinets under the provisions of Section 262716.
- D. Make electrical wiring interconnections as indicated.

END OF SECTION 26 09 16

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Occupancy sensors.
- B. Time switches.
- C. In-wall time switches.
- D. Outdoor photo controls.
- E. Daylighting controls.

1.2 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260537 - Boxes.
- C. Section 260553 - Identification for Electrical Systems: Labels for lighting control devices.
- D. Section 262716 - Electrical Cabinets and Enclosures.
- E. Section 262726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, fan speed controllers, and wall plates.
- F. Section 265100 - Interior Lighting.
- G. Section 265600 - Exterior Lighting.

1.3 REFERENCE STANDARDS

- A. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2006.
- B. ANSI C136.24 - American National Standard for Roadway and Area Lighting Equipment - Nonlocking (Button) Type Photocontrols; 2004 (R2010).
- C. NECA 1 - Good Workmanship in Electrical Construction; 2006.

- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
- E. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Fluorescent Ballasts; National Electrical Manufacturers Association; 2004.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association 2005 with amendments from the 2019 California Electrical Code (CEC)
- G. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.
- H. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.
- I. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
4. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
5. Notify the Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:

1. Do not install lighting control devices until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

C. Shop Drawings:

College of Alameda Transportation Technology
20-175

Issue Date:
Revision Date:

1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.

D. Field Quality Control Reports.

E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Operation and Maintenance Data: Include detailed information on device programming and setup.

G. Maintenance Materials: Furnish the following for the District's use in maintenance of project.

1. See Section 01 78 23 - Product Requirements, for additional provisions.

H. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.6 QUALITY ASSURANCE

A. Conform to requirements of CEC 2019.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.8 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.9 WARRANTY

A. See Section 01 78 36 - Closeout Submittals, for additional warranty requirements.

B. Provide five-year manufacturer warranty for all occupancy sensors.

C. Provide five-year manufacturer warranty for utility grade locking receptacle-mounted outdoor photo controls.

- D. Provide two-year manufacturer warranty for all daylighting controls.

PART 2 - PRODUCTS

2.1 ALL LIGHTING CONTROL DEVICES

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.
- C. Products for Switching of Electronic Fluorescent Ballasts: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

2.2 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. WattStopper; www.wattstopper.com.
 - 2. Substitutions: See Section 01 22 00 - Product Requirements.
 - 3. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
 - b. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.
 - c. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
 - d. Passive Infrared/Acoustic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and audible sound sensing technologies.

3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
 5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
 6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
 7. Turn-Off Delay: Field adjustable, up to a maximum time delay setting of not less than 15 minutes and not more than 30 minutes.
 8. Sensitivity: Field adjustable.
 9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
 10. Integral Photocell: For field selectable and adjustable inhibition of automatic turn-on of load when ambient lighting is above the selected level.
 11. Compatibility: Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
 12. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.
 13. Isolated Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated.
- C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Unless otherwise indicated or required to control the load indicated on the drawings, provide line voltage units with self-contained relay.
 - c. Where indicated, provide two-circuit units for control of two separate lighting loads, with separate manual controls and separately programmable operation for each load.

- d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
 - e. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
 - f. Finish: Match finishes specified for wiring devices in Section 262726, unless otherwise indicated.
 - g. Provide vandal resistant lenses for passive infrared (PIR) and dual technology wall switch occupancy sensors where indicated.
2. Passive Infrared (PIR) Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
 3. Ultrasonic Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 400 square feet.
 4. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
- D. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 - b. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.
 2. Passive Infrared (PIR) Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
 - b. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
 3. Ultrasonic Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within an area of 500 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
 - b. Medium Range Sensors: Capable of detecting motion within an area of 1,000 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
 - c. Extended Range Sensors: Capable of detecting motion within an area of 2,000 square feet at a mounting height of 9 feet.

4. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
 - b. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
5. Passive Infrared/Acoustic Dual Technology Ceiling Mounted Occupancy Sensors:
 - a. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet.
- E. Directional Occupancy Sensors:
 1. All Directional Occupancy Sensors: Designed for wall or ceiling mounting, with integral swivel for field adjustment of motion detection coverage.
 2. Passive Infrared (PIR) Directional Occupancy Sensors:
 - a. Long Range Sensors: Capable of detecting motion within a distance of 80 feet at a mounting height of 10 feet.
 3. Passive Infrared/Ultrasonic Dual Technology Directional Occupancy Sensors: Capable of detecting motion within a distance of 40 feet at a mounting height of 10 feet.
- F. Luminaire Mounted Occupancy Sensors: Designed for direct luminaire installation and control, suitable for use with specified luminaires.
- G. Power Packs for Low Voltage Occupancy Sensors:
 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on the drawings.
 3. Input Supply Voltage: Dual rated for 120/277 V ac.
- H. Accessories:
 1. Provide heavy duty coated steel wire protective guards compatible with specified occupancy sensors where indicated.

2.3 TIME SWITCHES

- A. Digital Electronic Time Switches:

1. Description: Factory-assembled solid state programmable controller with LCD display, listed and labeled as complying with UL 916 or UL 917.
2. Program Capability:
3. Schedule Capacity: Not less than 16 programmable on/off operations.
4. Provide automatic daylight savings time and leap year compensation.
5. Provide power outage backup to retain programming and maintain clock.
6. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
7. Input Supply Voltage: As indicated on the drawings.
8. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:

B. Electromechanical Time Switches:

1. Description: Factory-assembled controller with motor-operated timing dial mechanism and adjustable trippers for setting on/off operations, listed and labeled as complying with UL 917.
2. Program Capability:
3. Schedule Capacity:
4. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
5. Input Supply Voltage: As indicated on the drawings.
6. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:

2.4 IN-WALL TIME SWITCHES

A. Digital Electronic In-Wall Time Switches:

1. Description: Factory-assembled solid state programmable controller with LCD display, suitable for mounting in standard wall box, and listed and labeled as complying with UL 916 or UL 917.
2. Program Capability:
3. Schedule Capacity: Not less than 40 programmable on/off operations.
4. Provide power outage backup to retain programming and maintain clock.

5. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
6. Switch Configuration: Suitable for use in either SPST or 3-way application.

B. Electromechanical In-Wall Time Switches:

1. Description: Factory-assembled controller with motor-operated timing dial mechanism and adjustable trippers for setting on/off operations, suitable for mounting in standard wall box, and listed and labeled as complying with UL 917.
2. Program Capability: 24-hour time switch with same schedule for each day of the week.
3. Schedule Capacity: Accommodating not less than 24 selected on/off operations per day.
4. Manual override: Capable of permanently overriding current schedule.
5. Switch Configuration: SPST.

2.5 OUTDOOR PHOTO CONTROLS

A. Stem-Mounted Outdoor Photo Controls:

1. Description: Direct-wired photo control unit with threaded conduit mounting stem and field-adjustable swivel base, listed and labeled as complying with UL 773A.
2. Housing: Weatherproof, impact resistant polycarbonate.
3. Photo Sensor: Cadmium sulfide.
4. Provide external sliding shield for field adjustment of light level activation.
5. Light Level Activation: 1 to 5 footcandles turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
6. Voltage: As required to control the load indicated on the drawings.
7. Failure Mode: Fails to the on position.
8. Load Rating: As required to control the load indicated on the drawings.

2.6 DAYLIGHTING CONTROLS

A. System Description: Control system consisting of photo sensors and compatible control modules and power packs, contactors, or relays as required for automatic control of load indicated according to available natural light; capable of integrating with occupancy sensors and manual override controls.

B. Daylighting Control Photo Sensors: Low voltage class 2 photo sensor units with output signal proportional to the measured light level and provision for zero or offset based signal.

1. Sensor Type: Filtered silicon photo diode.
2. Sensor Range:
 - a. Indoor Photo Sensors: 5 to 100 footcandles.
 - b. Skylight Photo Sensors: 1,000 to 6,000 footcandles.
- C. Dimming Photo Sensors: Photo sensor units with integral controller compatible with specified dimming ballasts, for direct continuous dimming of up to 50 ballasts.
- D. Daylighting Control Switching Modules: Low voltage class 2 control unit compatible with specified photo sensors, for switching of compatible power packs, contactors, or relays in response to changes in measured light levels according to selected settings.
 1. Operation: Unless otherwise indicated, load to be turned on when light level is below selected low set point and load to be turned off when light level is above selected high set point, with a no switching dead band between set points to prevent unwanted cycling.
 2. Input Delay: To prevent unwanted cycling due to intermittent light level fluctuations.
 3. Control Capability:
- E. Daylighting Control Dimming Modules: Low voltage class 2 control unit compatible with specified photo sensors and with specified dimming ballasts, for both continuous dimming of compatible dimming ballasts and switching of compatible power packs, contactors, or relays in response to changes in measured light levels according to selected settings.
 1. Operation: Unless otherwise indicated, specified load to be continuously brightened as not enough daylight becomes available and continuously dimmed as enough daylight becomes available.
 2. Control Capability: Capable of controlling up to three separately programmable channels, with up to 50 ballasts per channel.
 3. Dimming and Fade Rates: Adjustable from 5 to 60 seconds.
 4. Cut-Off Delay: Selectable and adjustable from 0 to 20 minutes.
- F. Power Packs for Daylighting Control Modules:
 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage daylighting control modules for switching of line voltage loads. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on the drawings.
 2. Input Supply Voltage: Dual rated for 120/277 V ac.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1, including mounting heights specified in that standard unless otherwise indicated
- B. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of lighting control devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
 - b. In-Wall Time Switches: 48 inches above finished floor.
 - c. In-Wall Interval Timers: 48 inches above finished floor.
 - 2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.

3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify LP Consulting Engineers to obtain direction prior to proceeding with work.
- C. Install lighting control devices in accordance with manufacturer's instructions.
 - D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - E. Install lighting control devices plumb and level, and held securely in place.
 - F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 262726.
 - G. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
 - H. Occupancy Sensor Locations:
 1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
 2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.
 - I. Outdoor Photo Control Locations:
 1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
 2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.
 - J. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.
 - K. Daylighting Control Photo Sensor Locations:
 1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for proper control of respective room or area based on manufacturer's recommendations for installed devices.
 2. Unless otherwise indicated, locate photo sensors for closed loop systems to accurately measure the light level controlled at the designated task location, while minimizing the measured amount of direct light from natural or artificial sources such as windows or pendant luminaires.

3. Unless otherwise indicated, locate photo sensors for open loop systems to accurately measure the level of daylight coming into the space, while minimizing the measured amount of lighting from artificial sources.
- L. Lamp Burn-In: Operate lamps at full output for minimum of 100 hours or prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
- M. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.

3.4 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Test time switches to verify proper operation.
- E. Test outdoor photo controls to verify proper operation, including time delays where applicable.
- F. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.
- G. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.5 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by LP Consulting Engineers.
- C. Adjust position of directional occupancy sensors and outdoor motion sensors to achieve optimal coverage as required.
- D. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.
- E. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by LP Consulting Engineers. Record settings in written report to be included with submittals.

- F. Adjust external sliding shields on outdoor photo controls under optimum lighting conditions to achieve desired turn-on and turn-off activation as indicated or as directed by LP Consulting Engineers.
- G. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by LP Consulting Engineers.

3.6 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.7 COMMISSIONING

- A. See Section 019113 for commissioning requirements.

3.8 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of lighting control devices to LP Consulting Engineers, and correct deficiencies or make adjustments as directed.
- D. Training: Train District's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
 - 4. Location: At project site.

END OF SECTION 26 09 23

SECTION 26 22 10

DRY-TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of this section are in addition to the requirements of Division 1, General Conditions and Supplementary Conditions.

1.2 SUMMARY

- A. Scope: Provide Dry type transformers as shown on the Drawings.

1.3 QUALITY ASSURANCE

- A. Transformers shall be designed, manufactured and tested in accordance with all the latest applicable ANSI, NEMA and IEEE standards, and shall be listed by Underwriters Laboratories and bear the UL label.
- B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, 365 days a year, with normal life expectancy as defined in ANSI C57.96.

1.4 QUALIFICATIONS

- A. The equipment manufacturer shall be ISO 9000, 9001 or 9002 certified.
- B. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- C. The transformers shall be suitable for and certified to meet all applicable seismic requirements of Uniformed Building Code (UBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the transformer manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC: a peak of 0.75g, and a ZPA of 0.38g. The tests shall fully envelope this response spectrum for all equipment natural frequencies up to at least 35 Hz.
- D. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.
 - 1. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision. Mounting recommendations shall be provided by the manufacturer based upon approved shake table tests used to verify the seismic design of the equipment.

2. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
3. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response.

1.5 SUBMITTALS

- A. Submit manufacturers data and shop drawings in accordance with Section 16010 for items listed.
 1. Manufacturers Data Sheets
 2. Outline dimension and weights
 3. Technical certification sheet
 4. Conduit entry/exit locations
 5. Transformer ratings including:
 - a. kVA
 - b. Primary and secondary Voltage
 - c. Taps
 - d. Basic Impulse level (BIL) for equipment over 600-volts
 - e. Design Impedance
 - f. Insulation class and temperature rise
 - g. Sound level

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Transformer shall be convection cooled that comply with NEMA Standard TP1 with ratings (kVA) and voltages as indicated on the drawings. Provide NEMA 1 (indoor) or NEMA 3R with weather shields (outdoor) enclosed units designed specifically for energy efficient operation and bear the "Energy Star" label and not greater than 80-degree C. temperature rise over 40-degree C. ambient. Enclosure temperature rise may not exceed 50-degree C. over 40-degree C. ambient. Enclosures shall include insect screens. Enclosures shall be modified or protected, as required, to make them safe for installation on school grounds.

B. Manufacturer shall guarantee that sound level will not exceed NEMA standard for the KVA rating of the transformer. Applicable NEMA standards are as follows:

1.	KVA	NEMA	Average	Sound Level
a.		0 - 9		40 dB
b.		10 - 50		45 dB
c.		51 - 150		50 dB
e.		151 - 300		55 dB
f.		301 - 500		60 dB
g.		501 - 700		62 dB
h.		701 - 1000		64 dB
i.		1001 - 1500		65 dB

C. The windings shall be separate primary and secondary coils factory connected in Delta primary and grounded WYE secondary configuration. A secondary system grounding lug shall be provided prewired to WYE "neutral" and transformer enclosure.

D. Primary taps shall be full capacity, with a minimum of two 2-1/2% above and below rated voltage.

1. Weather exposed "3 & 3R" rated transformer shall have weather shield and enclosures shall have all metal surfaces painted with dry powder polyurethane plastic, electrostatically applied to produce a minimum finish of three (3) mils thick. The coated metal shall be baked at a temperature of 4000 degrees Fahrenheit for a period of no less than 20 minutes.
2. The transformers shall be manufactured by Cutler-Hammer series. Only transformers by Square-D series will be accepted as equals.

E. Provide vibration isolating mounts to isolate the enclosure from the core and coil assembly.

F. Mounting, suitable as listed:

1. Three Phase Transformers, through 15 kVA: Wall
2. Three Phase Transformers, 15 kVA and above: Floor or ceiling hung channel.

G. Connect a grounding strap from the secondary neutral to a grounding lug on the enclosure.

2.2 MANUFACTURER

A. Cutler-Hammer

- B. Squire-D
- C. Siemens
- D. Or equivalent subject to substitution process.

PART 3 - EXECUTION

3.1 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.
 - 1. Ratio tests at the rated voltage connection and at all tap connections.
 - 2. Polarity and phase relation tests on the rated voltage connection.
 - 3. Applied potential tests.
 - 4. Induced potential test.
 - 5. No-load and excitation current at rated voltage on the rated voltage connection.

3.2 INSTALLATION

- A. Transformers shall be installed in accordance with manufacturer's instructions and the requirements of the California Electrical Code (CEC). Verify clearances required and CEC ventilation requirements. Enclosures shall be modified or protected, as required, to make them safe for installation on school grounds. Terminations and all exposed portions of current carrying conductors shall be covered with heavy wall heat shrink tubing. Use an electric heat gun to shrink tubing. Install bug screens and weatherproof kits on all transformers not installed in buildings.
- B. Secure wall mounted transformers to building structure with not less than four 5/8" bolts or screws and flat washers as required and/or as shown on plans.
- C. Provide one (1) vibration isolating mount, minimum 1 inch thick with 1-inch static deflection, for each mounting point on the transformer.
- D. Connect transformer with flexible metal conduit. Provide an insulated grounding bushing on conduit and bond to transformer case.
- E. Provide house cleaning concrete pad for all floor mounted transformer. Secure floor mounted transformers to concrete pad with not less than four 5/8" galvanized machine bolts and flat washers as required. Concrete anchors shall be HILTI heavy duty "HSL" series with 3-1/2" embedment and/or as shown on plans.

- F. Final locations of all transformers shall be verified with the project Architect for acceptance prior to installation of conduit. Transformers and their associated concrete pads shall be installed in locations outside of designated pedestrian circulation (i.e. sidewalks, corridors, path ways, etc.); and where the sound rating or the transformer will not interfere with building interior functionality and tasks.
- G. Install grounding electrode conductor, shown on the Drawings, for separately derived system to all available grounding electrodes, i.e., building service equipment, grounding conductor, building steel, cold water pipe, as applicable. A single connection to a new or existing "made electrode" isolated from the building service equipment ground will not be acceptable.

3.3 TRANSFORMERS INSTALLED IN INTEGRATED FACILITIES SWITCHBOARD (IFS)

- A. Dry Type Transformer in Integrated Facilities Switchboard (IFS) as shown on the contract drawings shall be integrated and assembled into the switchboard by the IFS manufacturer. The Integrated Facilities Switchboard (IFS) is as described in Section 262414.

3.4 FIELD ADJUSTMENTS

- A. Adjust taps to deliver appropriate secondary voltage.

3.5 FIELD TESTING

- A. Measure primary and secondary voltages for proper tap settings.

END OF SECTION 26 22 10

SECTION 26 24 13

SWITCHBOARD AND DISTRIBUTION PANEL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Switchboards and Distribution Panel.
- B. Switchboard and Distribution Panel accessories.

1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete for supporting foundations and pads.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.

1.3 REFERENCE STANDARDS

- A. ANSI C12.1 - American National Standard Code for Electricity Metering; 2008.
- B. ANSI C39.1 - American National Standard Requirements for Electrical Analog Indicating Instruments; 1981 (R1992).
- C. IEC 60051-1 - Direct Acting Indicating Analogue Electrical Measuring Instruments and Their Accessories - Part 1: Definitions and General Requirements Common to All Parts; 1997.
- D. IEEE C12.1 - American National Standard Code for Electricity Metering; Institute of Electrical and Electronic Engineers; 1988.
- E. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers; Institute of Electrical and Electronic Engineers; 2008.
- F. NECA 400 - Standard for Installing and Maintaining Switchboards (ANSI); National Electrical Contractors Association; 2007.
- G. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2001 (R2006).
- H. NEMA PB 2 - Deadfront Distribution Switchboards; National Electrical Manufacturers Association; 2006.
- I. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2007.

- J. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- K. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of all equipment and components.
- C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; and switchboard instrument details.
- D. Test Reports: Indicate results of factory production tests.
- E. Maintenance Materials: Furnish the following for District's use in maintenance of project.
 - 1. See Section 01 78 23 - Product Requirements, for additional provisions.
 - 2. Enclosure Keys: Two of each different key.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in 48-inch maximum width shipping splits, individually wrapped for protection and mounted on shipping skids.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle in accordance with NEMA PB 2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton Corporation; Cutler-Hammer Products: www.eaton.com.
- B. Schneider Electric; Square D Products:
- C. Siemens
- D. Or equivalent subject to substitution process.

2.2 DISTRIBUTION PANEL

- A. Description: NEMA PB 2 switchboard with electrical ratings and configurations as indicated and specified.
- B. Ratings:
 - 1. Voltage: 277/480 volts and 120/208 volts.
 - 2. Configuration: Three phase, four wires, grounded.
 - 3. Main Bus: Amperes per plan.
- C. Main Section Devices: Panel mounted.
- D. Distribution Section Devices: Panel mounted.
- E. Bus Material: Copper, standard size.
- F. Bus Connections: Bolted, accessible from front for maintenance.
- G. Ground Bus: Extend length of switchboard.
- H. Insulated Ground Bus: Extend length of switchboard.
- I. Fusible Switch Assemblies, 800 Amperes and Larger: Bolted pressure contact switches. Fuse clips: Designed to accommodate Class L fuses.
- J. Molded Case Circuit Breakers: Integral thermal and instantaneous magnetic trip in each pole.
 - 1. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
 - 2. Include shunt trip where indicated.
- K. Current Limiting Molded Case Circuit Breakers: UL listed.

1. Integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole.
 2. Interrupting rating 100,000 rms amperes symmetrical let-through current and energy level less than permitted for same size Class RK-5 fuse.
 3. Include shunt trip where indicated.
- L. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and sizes indicated.
- M. Ground Fault Sensor: Zero sequence type.
- N. Ground Fault Relay: Adjustable ground fault sensitivity from 200 to 1200 amperes, time delay seconds. Provide monitor panel with lamp to indicate relay operation, TEST and RESET control switches.
- O. Metering Transformer Compartment: For utility company's use; compartment size, bus spacing and drilling, door, and locking and sealing requirements in accordance with Section 262701.
- P. Pull Section:
1. Size as shown on Drawings.
 2. Arrange as shown on Drawings.
- Q. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Provide continuous current rating as indicated.
- R. Pull Box: Removable top and sides, same construction as switchboard.
1. Size as shown on Drawings.
 2. Set front back sufficient distance to accommodate circuit breaker lifting devices.
 3. Provide insulating, fire-resistive bottom with separate openings for each circuit to pass into switchboard.
- S. Enclosure: Type 1 - General Purpose.
1. Align sections at front and rear.
 2. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

2.3 ACCESSORIES

- A. Circuit Breaker Lifting Device: Portable, floor supported, elevating carriage with a roller base, for movement of circuit breakers in and out of switchboard structure.

2.4 SOURCE QUALITY CONTROL

- A. Shop inspect and test switchboard according to NEMA PB 2.
- B. Make completed switchboard available for inspection at manufacturer's factory prior to packaging for shipment. Notify the District at least 7 days before inspection is allowed.
- C. Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify the District at least 7 days before inspections and tests are scheduled.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide concrete housekeeping pad under the provisions of Section 033000.
- B. Verify that field measurements are as indicated on shop drawings.

3.2 INSTALLATION

- A. Install switchboard in locations shown on drawings, according to NEMA PB 2.1.
- B. Install in a neat and workmanlike manner, as specified in NECA 400.
- C. Tighten accessible bus connections and mechanical fasteners after placing switchboard.
- D. Install fuses in each switch.

3.3 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 014000.
- B. Inspect and test in accordance with NETA STD ATS, except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.1.

3.4 ADJUSTING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Tighten bolted bus connections in accordance with manufacturer's instructions.
- C. Adjust circuit breaker trip and time delay settings to values indicated.

3.5 CLEANING

- A. Touch up scratched or marred surfaces to match original finish.

END OF SECTION 26 24 13

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.

1.2 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260553 - Identification for Electrical Systems.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC; National Electrical Manufacturers Association; 2000 (R2005).
- C. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2001 (R2006).
- D. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association; 2006.
- E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2007.
- F. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- G. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2019 California Electrical Code amendments.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- C. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.
- D. Maintenance Materials: Furnish the following for District (Owner)'s use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Panelboard Keys: Two of each different key.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton Corporation; Cutler-Hammer Products: www.eaton.com.
- B. Schneider Electric; Square D Products:
- C. Siemens
- D. Or equivalent subject to substitution process

2.2 POWER DISTRIBUTION PANELBOARDS

- A. Description: NEMA PB 1, circuit breaker type.
- B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.
- C. Minimum integrated short circuit rating: As indicated.
 - 1. 208 Volt Panelboards: amperes rms symmetrical per plan.
 - 2. 480 Volt Panelboards: amperes rms symmetrical per plan.
- D. Molded Case Circuit Breakers: With integral thermal and instantaneous magnetic trip in each pole; UL listed. For air conditioning equipment branch circuits provide circuit breakers UL listed as Type HACR.

- E. Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower, with bimetal overload relay.
 - 1. Coil operating voltage: 120 volts, 60 Hz.
 - 2. Size as shown on Drawings.
- F. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.
- G. Enclosure: NEMA PB 1, Type 1, cabinet box.
- H. Cabinet Front: Surface type, fastened with concealed trim clamps, hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

2.3 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard; provide insulated ground bus where scheduled.
- C. Minimum Integrated Short Circuit Rating: As indicated.
 - 1. 2208 Volt Panelboards: 10,000 amperes rms symmetrical.
 - 2. 480 Volt Panelboards: 14,000 amperes rms symmetrical.
- D. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for all poles; UL listed.
 - 1. Type SWD for lighting circuits.
 - 2. Type HACR for air conditioning equipment circuits.
 - 3. Class A ground fault interrupter circuit breakers where scheduled.
 - 4. Do not use tandem circuit breakers.
- E. Enclosure: NEMA PB 1, Type 1.
- F. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards, 20 inches wide for 480 volt panelboards.
- G. Cabinet Front: Flush cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.
- B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.
- C. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- D. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- E. Provide engraved plastic nameplates under the provisions of Section 260553.
- F. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as SPARE.
 - 1. Minimum spare conduits: 5 empty 1 inch.
- G. Ground and bond panelboard enclosure according to Section 260526.

3.2 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 014000.
- B. Inspect and test in accordance with NETA STD ATS, except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.5 for switches, Section 7.6 for circuit breakers.

3.3 ADJUSTING

- A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION 26 24 16

SECTION 26 27 16
ELECTRICAL CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Hinged cover enclosures.
- B. Cabinets.
- C. Terminal blocks.
- D. Accessories.

1.2 RELATED REQUIREMENTS

- A. Section 260529 - Hangers and Supports for Electrical Systems.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- C. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks; National Electrical Manufacturers Association; 2005.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2007 California Electrical Code amendments.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard data for enclosures and cabinets.
- C. Cabinet Keys: Deliver to District in accordance with Section 016000 for maintenance materials.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.

- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 ENCLOSURE MANUFACTURERS

- A. Cooper B-Line: www.bline.com.
- B. Qube Corporation: www.qubeinc.com.
- C. Robroy Industries: www.robroy.com.
- D. Or equal.
- E. Substitutions: See Section 01 25 13 - Product Requirements.

2.2 HINGED COVER ENCLOSURES

- A. Construction: NEMA 250, Type 1 steel enclosure.
- B. Covers: Continuous hinge, held closed by flush latch operable by screwdriver.
- C. Provide interior plywood panel for mounting terminal blocks and electrical components; finish with white enamel.
- D. Enclosure Finish: Manufacturer's standard enamel.

2.3 CABINETS

- A. Boxes: Galvanized steel.
- B. Backboard: Provide 3/4-inch-thick plywood backboard for mounting terminal blocks. Paint matte white.
- C. Fronts: Steel, flush type with concealed trim clamps, door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel.
- D. Provide metal barriers to form separate compartments wiring of different systems and voltages.
- E. Keys: Provide two of each different key.

2.4 TERMINAL BLOCKS

- A. Manufacturers:
 - 1. Allen-Bradley/Rockwell Automation: www.ab.com.

2. Cooper Bussmann: www.bussmann.com.
 3. WECO Electrical Connectors Inc: www.weco.ca.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Terminal Blocks: NEMA ICS 4.
 - C. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
 - D. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
 - E. Provide ground bus terminal block, with each connector bonded to enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner under the provisions of Section 260529.
- C. Install cabinet fronts plumb.

3.2 CLEANING

- A. Clean electrical parts to remove conductive and harmful materials.
- B. Remove dirt and debris from enclosure.
- C. Clean finishes and touch up damage.

END OF SECTION 26 27 16

SECTION 26 27 17
EQUIPMENT WIRING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Electrical connections to equipment.

1.2 RELATED REQUIREMENTS

- A. Section 260534 - Conduit.
- B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).
- C. Section 260537 - Boxes.
- D. Section 262726 - Wiring Devices.

1.3 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).
- B. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).
- C. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2007 California Electrical Code amendments.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Conform to NEMA WD 1.
 - 2. Cord Construction: CEC 2019, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Disconnect Switches: As described and in individual equipment sections.
- C. Wiring Devices: As specified in Section 262726.
- D. Flexible Conduit: As specified in Section 260534.
- E. Wire and Cable: As specified in Section 260519.
- F. Boxes: As specified in Section 260537.

PART 3- EXECUTION

3.1 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.

- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

END OF SECTION 26 27 17

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Fan speed controllers.
- D. Receptacles.
- E. Wall plates.
- F. Floor box service fittings.
- G. Poke-through assemblies.

1.2 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260537 - Boxes.
- C. Section 260553 - Identification for Electrical Systems: Labels for wiring devices.
- D. Section 262717 - Equipment Wiring: Cords and plugs for equipment.
- E. Section 271005 - Structured Telecommunications Cabling and Enclosures: Voice and data jacks.

1.3 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.
- C. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

- D. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).
- E. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).
- F. NFPA 70 - National Electrical Code; National Fire Protection Association, 2005 with 2007 California Electrical Code amendments.
- G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- K. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.
- L. UL 1917 - Solid-State Fan Speed Controls; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
6. Notify the Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:

1. Do not install wiring devices until final surface finishes and painting are complete.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
 - 1. Wall Dimmers: Include derating information for ganged multiple devices.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Pass & Seymore
- B. Cooper Wiring Devices: www.cooperwiringdevices.com.
- B. Leviton Manufacturing, Inc: www.leviton.com.
- D. Or equal.

2.2 APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFI receptacles with specified weatherproof covers for all receptacles installed outdoors or in damp or wet locations.
- D. Provide GFI receptacles for all receptacles installed within 6 feet of sinks.
- E. Provide GFI receptacles for all receptacles installed in kitchens.
- F. Provide GFI receptacles for all receptacles serving electric drinking fountains.

- G. Provide isolated ground receptacles for all receptacles serving computers and electronic cash registers.
- H. Unless noted otherwise, do not use combination switch/receptacle devices.
- I. For flush floor service fittings, use tile rings for installations in tile floors.
- J. For flush floor service fittings, use carpet flanges for installations in carpeted floors.

2.3 ALL WIRING DEVICES

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Finishes:
 - 1. All Wiring Devices: White with white nylon wall plate unless otherwise indicated.
 - 2. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate unless otherwise indicated.
 - 3. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate unless otherwise indicated.
 - 4. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover unless otherwise indicated.
 - 5. Isolated Ground Convenience Receptacles: Orange with isolated ground triangle mark on device face.
 - 6. Surge Protection Receptacles: Blue.
 - 7. Clock Hanger Receptacles: White with nylon wall plate.
 - 8. Above-Floor Service Fittings: wiring devices with housing.
 - 9. Flush Floor Box Service Fittings: wiring devices with cover and ring/flange.
 - 10. Flush Poke-Through Service Fittings: wiring devices with cover and aluminum flange.

2.4 WALL SWITCHES

- A. All Wall Switches: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

- B. Pilot Light Wall Switches: Industrial specification grade, 20 A, 120/277 V with red illuminated standard toggle type switch actuator and maintained contacts; illuminated with load on; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
- C. Locking Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed switch actuator and maintained contacts; all switches keyed alike; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
- D. Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with toggle type three position switch actuator and momentary contacts; single pole double throw, off with switch actuator in center position.
- E. Locking Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed three position switch actuator and momentary contacts; all switches keyed alike; single pole double throw, off with switch actuator in center position.
- F. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
 - 1. Body and Handle: white plastic with toggle handle.
 - 2. Indicator Light: Lighted handle type switch; red handle.
 - 3. Locator Light: Lighted handle type switch; red color handle.
 - 4. Ratings:
 - a. Voltage: 120 and 277 volts, AC.
 - b. Current: 20 amperes.
- G. Switch Types: Single pole, double pole, and 3-way.

2.5 WALL DIMMERS

- A. All Wall Dimmers: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.
- B. Electronic Low-Voltage Wall Dimmers: 120 V AC, slide control type with separate on/off switch; single pole or three way as indicated on the drawings.
 - 1. Power Rating: 400 VA unless otherwise indicated or required to control the load indicated on the drawings.
- C. Fluorescent Wall Dimmers: 120 V AC, slide control type with separate on/off switch, compatible with dimming ballast controlled; single pole or three way as indicated on the drawings.

1. Power Rating: 600 VA unless otherwise indicated or required to control the load indicated on the drawings.
- D. Wall Dimmers: Semiconductor dimmer for incandescent lamps, Type as indicated on drawings, complying with NEMA WD 6 and WD 1.
1. Body and Handle: white plastic with rotary knob.
 2. Voltage: 120 and 277 volts.
 3. Power Rating: 600 watts.
- E. Provide accessory wall switches to match dimmer appearance when installed adjacent to each other.

2.6 FAN SPEED CONTROLLERS

- A. Description: 120 V AC, solid-state, full-range variable speed, slide control type with separate on/off switch, with integral radio frequency interference filtering, fan hum elimination circuitry, field-adjustable trim, power failure preset memory, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1917.
1. Current Rating: 1.5 A unless otherwise indicated or required to control the load indicated on the drawings.

2.7 RECEPTACLES

- A. All Receptacles: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 2. Isolated Ground Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, with ground contacts isolated from mounting strap; single or duplex as indicated on the drawings.
 3. Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

4. Tamper Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
5. Tamper Resistant and Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

C. GFI Receptacles:

1. All GFI Receptacles: Provide with feed-through protection, light to indicate ground fault tripped condition and loss of protection, and list as complying with UL 943, class A.
2. Standard GFI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
3. Weather Resistant GFI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
4. Tamper Resistant GFI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
5. Tamper Resistant and Weather Resistant GFI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

D. Receptacles: Heavy duty, complying with NEMA WD 6 and WD 1.

1. Device Body: white plastic.
2. Configuration: NEMA WD 6, type as specified and indicated.

E. Convenience Receptacles: Type 5 to 15.

F. Single Convenience Receptacles.

G. Duplex Convenience Receptacles.

H. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.8 TELEPHONE AND DATA JACKS

2.9 WALL PLATES

- A. All Wall Plates: Comply with UL 514D.
 - 1. Configuration: One-piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard;
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- E. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- F. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected.
- G. Decorative Cover Plates: white, nylon.
- H. Jumbo Cover Plates: Ivory, nylon.
- I. Weatherproof Cover Plates: Gasketed cast metal with hinged.

2.10 FLOOR BOX SERVICE FITTINGS

- A. Description: Service fittings compatible with floor boxes provided under Section 260537 with all components, adapters, and trims required for complete installation.
- B. Above-Floor Service Fittings:
- C. Flush Floor Service Fittings:
 - 1. Single Service Flush Convenience Receptacles:
 - a. Cover: Rectangular.
 - b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
 - 2. Single Service Flush Communications Outlets:
 - a. Cover: Rectangular.
 - b. Configuration: .

3. Single Service Flush Furniture Feed:

- a. Cover: Rectangular.
- b. Configuration: One 2-1/8 inch by 3/4 inch combination threaded opening(s).

4. Dual Service Flush Combination Outlets:

- a. Cover: Rectangular.
- b. Configuration:
 - 1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
 - 2) Communications:

5. Dual Service Flush Furniture Feed:

- a. Cover: Rectangular.
- b. Configuration:
 - 1) Power: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
 - 2) Communications: One 2-1/8 inch by 1 inch combination threaded opening(s).

6. Accessories:

- a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
- b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

D. Flush Cover Convenience Receptacles:

- 1. Material: Brass.

E. Flush Cover Communication Outlets:

F. Flush Cover Combination Fittings:

- 1. Material: Brass.

G. Protective Ring: Brass finish.

H. Split Nozzles: Brass finish.

I. Carpet Rings: Brass.

2.11 POKE-THROUGH ASSEMBLIES

- A. Description: Assembly comprising floor service fitting, poke-through component, fire stops and smoke barriers, and junction box for conduit termination; fire rating listed to match fire rating of floor and suitable for floor thickness where installed.
- B. Above-Floor Service Fittings:
- C. Flush Floor Service Fittings:
 - 1. Single Service Flush Convenience Receptacles:
 - a. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
 - 2. Single Service Flush Communications Outlets:
 - a. Configuration:
 - b. Voice and Data Jacks: As specified in Section 271005.
 - 3. Single Service Flush Furniture Feed:
 - a. Configuration: One 2 inch by 1-1/4 inch combination threaded opening(s).
 - 4. Dual Service Flush Combination Outlets:
 - a. Cover: Hinged door(s).
 - b. Configuration:
 - 1) Power: One standard convenience duplex receptacle(s).
 - 2) Communications: ____.
 - 3) Voice and Data Jacks: As specified in Section 271005.
 - 5. Dual Service Flush Furniture Feed:
 - a. Configuration:
 - 1) Power: One 3/4 inch threaded opening(s).
 - 2) Communications: Two 1/2 inch threaded opening(s).
 - 6. Accessories:
 - a. Closure Plugs: Size and fire rating as required to seal unused core hole and maintain fire rating of floor.

PART 3 - EXECUTION

3.1 EXAMINATION

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20-175

Issue Date:
Revision Date:

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with CEC 2019.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that floor boxes are adjusted properly.
- F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- G. Verify that core drilled holes for poke-through assemblies are in proper locations.
- H. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1, including mounting heights specified in that standard unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Wall Dimmers: 48 inches above finished floor.
 - c. Fan Speed Controllers: 48 inches above finished floor.
 - d. Receptacles: 18 inches above finished floor or 6 inches above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.

4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify LP Consulting Engineers to obtain direction prior to proceeding with work.
 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
 - D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
 - E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
 - F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
 - G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - H. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.
 - I. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
 - J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
 - K. Install wall switches with OFF position down.
 - L. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
 - M. Do not share neutral conductor on branch circuits utilizing wall dimmers.
 - N. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
 - O. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
 - P. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

- Q. Install identification label for wall switches and wall dimmers in accordance with Section 260526 indicating load served when controlling loads that are not visible from the control location or multiple wall switches or wall dimmers are installed at one location.
- R. Install identification label for all receptacles in accordance with Section 260526 indicating serving branch circuit.
- S. Install poke-through closure plugs in all unused core holes to maintain fire rating of floor.
- T. Install receptacles with grounding pole on top.
- U. Connect wiring device grounding terminal to outlet box with bonding jumper.
- V. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- W. Connect wiring devices by wrapping conductor around screw terminal.
- X. Use jumbo size plates for outlets installed in masonry walls.
- Y. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- Z. Install protective rings on active flush cover service fittings.

3.4 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 260537 to obtain mounting heights specified.
- B. Install wall switch 48 inches above finished floor.
- C. Install convenience receptacle 18 inches above finished floor.
- D. Install convenience receptacle 6 inches above counter.
- E. Install dimmer 48 inches above finished floor.
- F. Install telephone jack 18 inches above finished floor.
- G. Install telephone jack for forward-reach wall telephone to position top of telephone at 48 inches above finished floor.
- H. Coordinate installation of access floor boxes with access floor system provided under Section 096900.

3.5 FIELD QUALITY CONTROL

- A. Perform field inspection, testing, and adjusting in accordance with Section 014000.

- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Operate each wall switch with circuit energized and verify proper operation.
- E. Verify that each receptacle device is energized.
- F. Test each receptacle to verify operation and proper polarity.
- G. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- H. Correct wiring deficiencies and replace damaged or defective wiring devices.
- I. Verify that each telephone jack is properly connected and circuit is operational.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 26 27 26

SECTION 26 28 13**FUSES****PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A. Fuses.
- B. Spare fuse cabinet.

1.2 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002 (R2007).
- B. NFPA 70 - National Electrical Code; National Fire Protection Association 2005 with California amendments CEC 2019.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data sheets showing electrical characteristics, including time-current curves.
- C. Maintenance Materials: Furnish the following for the District's use in maintenance of project.
 - 1. See Section 01 78 23 - Product Requirements, for additional provisions.
 - 2. Extra Fuses: Three of each type and size.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Cooper Bussmann
- B. Ferraz Shawmut, Inc
- C. Littelfuse
- D. Or Equal

2.2 FUSES - GENERAL

- A. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.
- C. Main Service Switches Larger than 600 amperes: Class L (time delay).
- D. Main Service Switches: Class RK1 (time delay).
- E. Power Load Feeder Switches: Class RK1 (time delay).
- F. Motor Load Feeder Switches: Class RK1 (time delay).
- G. Lighting Load Feeder Switches: Class RK1 (time delay).
- H. Other Feeder Switches: Class RK1 (time delay).
- I. General Purpose Branch Circuits: Class RK1 (time delay).
- J. Motor Branch Circuits: Class L time delay.

2.3 SPARE FUSE CABINET

- A. Description: Wall-mounted sheet metal cabinet with shelves, suitably sized to store spare fuses and fuse pullers specified.
- B. Doors: Hinged, with hasp for the District's padlock.

PART 3 - EXECUTION

3.1 INSTALLATION

College of Alameda Transportation Technology
20-175

Issue Date:
Revision Date:

- A. Install fuses with label oriented such that manufacturer, type, and size are easily read.
- B. Install spare fuse cabinet where indicated.

END OF SECTION 26 28 13

SECTION 26 28 16
DISCONNECTS

PART 1 – GENERAL

- 1.1 Furnish and install all disconnect switches as shown on the drawings and as required by the cec.
- 1.2 Submit manufacturers' data for all disconnects and fuses.

Part 2 – products

- 2.1 Acceptable manufacturers shall be square d, cutler hammer or siemens.
- 2.2 Equipment manufactured by general electric, and/or any other manufacturers not specifically listed in section 2.1 are not considered equal, or approved for use on this project.
- 2.3 All switches shall be heavy-duty type, externally operated, quick-make, quick-break, rated 600 volts or 240 volts as required, with the number of poles and ampacity as noted. All switches for motors shall be hp rated. Switches shall have nema-type 1 enclosures, except switches located where exposed to outdoor conditions shall have nema type 3r enclosure. Switches generally shall be fused except where noted to be non-fused on the drawings.
- 2.4 Where fuses are indicated, fuses shall be bussman or littlefuse (no known equal). Fuses shall be current limiting type with time delay characteristics to suit the equipment served.

PART 3 – EXECUTION

- 3.1 Mount all switches to structure or u-channel support. U-channel supports shall be cleaned and painted to prevent rust.
- 3.2 Switches shall be accessible with proper clearances in front per cec 110-19.
- 3.3 All lugs shall be torque tested in the presence of the inspector of record.
- 3.4 Arc flash and shock hazard
 - A. The contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in CEC 2019 or IEEE standard 1584-2002.
 - B. A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with CEC 2019, section 400.11. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.
 - C. The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.

- D. The design goal is to minimize the incident energy to which a maintenance employee may be exposed and in no case more than 8 cal./cm².

END OF SECTION 26 28 16

SECTION 26 29 23

MOTOR STARTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of this section are in addition to the requirements of Division 1, General Conditions and Supplementary Conditions.

1.2 SUMMARY

- A. Scope: Furnish all labor, materials, equipment and incidentals required, and install, complete ready for operation, and field test starters as shown on the Drawings and as described in the Specifications.
- B. Related Work Specified Elsewhere:
 - 1. Section 26 01 10, BASIC ELECTRICAL REQUIREMENTS
 - 2. Section 26 05 19, LOW VOLTAGE POWER CONDUCTORS & CALBES
 - 3. Section 26 05 26, GROUNDING AND BONDING
 - 4. Section 26 05 34, RACEWAY

1.3 QUALITY ASSURANCE

- A. All starters shall comply with applicable standards of the Underwriter's Laboratories and be NEMA rated.

1.4 REQUIREMENTS

- A. Motor starters (controllers) are to be provided for all motors that will perform the required functions as indicated on the Drawings. Starters are to be provided and/or installed under this Division of these Specifications where not otherwise provided by other Divisions. Motor size and type as indicated on the Drawings are to be used for reference only - verify data for motors actually provided.
- B. Note that motor starting equipment furnished under this Division is to be sized according to nameplate data of the motors actually provided. Due to substitutions or other types of equipment modifications, it is not particularly unusual to have motors or equipment provided that have electrical characteristics slightly different than those anticipated during design. Whenever this occurs, make such modifications to the circuit wiring, conduit sizing, disconnecting and starting equipment, and feeder circuit wiring, short circuit and over current protection as required. No additional compensation will be allowed for work or equipment associated with these types of modifications.

PART 2 - PRODUCTS

2.1 MOTOR STARTERS

- A. Size per applicable Electrical Codes. Where a combination starter is required, use a type with circuit breaker disconnecting device.
- B. Running Overload Protection: An overload relay shall be installed in each ungrounded motor circuit leg. They shall be sensitive to motor current only, have inverse time characteristics, and be of the manual reset type with a reset button operable from the outside of the starter enclosure. They shall be temperature compensated type. Select the overload relay heaters as required by the applicable Electrical Code only after the actual nameplate data for the motor has been determined.
- C. Provide and install all control devices not otherwise provided. This includes specifically: control transformers, pilot devices, push buttons and selector switches, auxiliary contacts, etc., which are required to be mounted on or within the starter enclosure. Each starter contactor shall be provided with at least one extra N.O. auxiliary contact.
- D. All motor starters shall be installed in enclosures suitable to the conditions (NEMA 3R where installed outdoors) and provided with a nameplate identifying the equipment controlled.
- E. Provide phase failure relays for motor loads over 25 horsepower.
- F. MANUFACTURERS: Starters shall be manufactured by Allen-Bradley (Bulletin 505 through 523 depending on the specific application and as described on the Drawings), Cutler-Hammer or equal.

2.2 MANUAL MOTOR STARTING SWITCHES

- A. Allen-Bradley Bulletin 600 or 609. Starters with under voltage protection, Bulletin 609U shall be provided where noted on the Drawings.
- B. Push button or toggle lever type switches shall be provided as noted. Where not otherwise indicated, provide toggle type.
- C. Running overload protection shall be provided by thermal overload devices operating on the melting solder-ratchet principle. Provide heater elements and size starting switches in accordance with nameplate data of motors actually supplied. Provide pilot and control devices as indicated on the Drawings. Enclosures shall be suitable for the conditions (NEMA 3R where installed outdoors or in wet locations) and a nameplate shall be provided indicating the controlled equipment.
- D. Where shown at a motor location on the Drawings, a local motor rated safety switch and motor circuit running current overload protection are required. These may be provided entirely or in part by the equipment manufacturer (internally protected motor with circuit connector, etc.); but if not, it is to be provided under this section of the Specifications.

2.3 ACCESSORIES

- A. Control stations shall be standard size, heavy-duty oil tight. Control Stations shall be manufactured by Allen-Bradley, or equal.

- B. All pilot devices (pushbuttons, selector switches, pilot lights, etc.) shall be the same manufacturer as the motor starters.
- C. Control Relays and Time Delay Relays shall be plug-in type with indicator light. Relays shall be manufactured by Idec, or equal.
- D. Phase failure relay shall detect phase loss, phase reversal, low voltage and phase unbalance. Phase failure relays shall be manufactured by Timemark series 258 or equal with base.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Motor starters are to be installed plumb and rigidly secured to structure or equipment with wood screws, bolts and expansion anchors, or machine bolts and locknuts as applicable.
- B. Nameplates shall be installed as indicated in Section 260110, Basic Electrical Requirements.

END OF SECTION 26 29 23

SECTION 26 42 00
CATHODIC PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section is found on sheet CP-5 of the drawings.

END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Interior luminaires.
- B. Exit signs.
- C. Ballasts.
- D. Fluorescent dimming ballasts and controls.
- E. Fluorescent emergency power supply units.
- F. Lamps.
- G. Luminaire accessories.

1.2 RELATED REQUIREMENTS

- A. Section 092116 - Gypsum Board Assemblies: Additional requirements for support of ceiling mounted fixtures.
- B. Section 095100 - Acoustical Ceilings: Additional requirements for support of ceiling mounted fixtures.
- C. Section 260537 - Boxes.
- D. Section 260923 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.
- E. Section 262726 - Wiring Devices: Manual wall switches and wall dimmers.

1.3 REFERENCE STANDARDS

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.

- C. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type); 2002.
- D. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; Consolidated-2002.
- E. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (R2008).
- F. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002.
- G. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- H. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.
- I. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; 2006.
- J. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Fluorescent Ballasts; National Electrical Manufacturers Association; 2004.
- K. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association; 2006.
- L. NFPA 70 - National Electrical Code (NEC); National Fire Protection Association.2020 and amendments from the California Electrical Code (CEC) 2019.
- M. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 2018.
- N. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- O. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.
- P. UL 1029 - High-Intensity-Discharge Lamp Ballasts; Current Edition, Including All Revisions.
- Q. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- R. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
4. Notify the Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 1. Provide photometric calculations where luminaires are proposed for substitution upon request.
- C. Shop Drawings: Indicate dimensions and components for each fixture that is not a standard product of the manufacturer.
- D. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 1. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IESNA LM-63 standard format upon request.
- E. Certificates for Dimming Ballasts: Manufacturer's documentation of compatibility with dimming controls to be installed.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- G. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- H. Maintenance Materials: Furnish the following for District's use in maintenance of project.
 1. See Section 016000 - Product Requirements, for additional provisions.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Conform to requirements of NFPA 101.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.8 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.9 WARRANTY

- A. See Section 01 78 36 - Closeout Submittals, for additional warranty requirements.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products as indicated in Lighting Fixture Schedule included on the Drawings
- B. Substitutions: See Section 01 25 13 - Product Requirements.

2.2 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule on the drawings.
- B. Or equal in performance and quality acceptable by the Architect and/or the District Representative.

2.3 LUMINAIRES

- A. Provide products that comply with requirements of CEC 2019.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products that comply with requirements of NFPA 70 and NFPA 101.
- D. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
 - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
- I. Fluorescent Luminaires:
 - 1. Provide ballast disconnecting means complying with CEC 2019 where required.
 - 2. Fluorescent Luminaires Controlled by Occupancy Sensors: Provide programmed start ballasts.
 - 3. Fluorescent Luminaires Controlled by Dual-Level Switching: Provide with two ballasts.
 - a. Luminaires with Two Lamps: Each ballast controls one lamp.
 - b. Luminaires with Three Lamps: One ballast controls two outer lamps and one ballast controls inner lamp.
 - c. Luminaires with Four Lamps: One ballast controls two outer lamps and one ballast controls two inner lamps.
- J. HID Luminaires:
 - 1. HID High Bay Luminaires: Provide safety chain or power hook unless otherwise indicated.

2. HID Luminaires with Quartz Restrike Systems: Factory-installed supplementary quartz lamp automatically switches on when power interruption causes primary HID lamp to drop out or during cold startup.
- K. LED Luminaires: Listed and labeled as complying with UL 8750.
- L. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.
- M. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.4 LUMINAIRES

- A. Furnish products as indicated in Lighting Fixture Schedule included on the Drawings.
- B. Substitutions: See Section 01 25 13 - Product Requirements.

2.5 EXIT SIGNS

- A. All Exit Signs: Internally illuminated with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
 1. Number of Faces: Single or double as indicated or as required for the installed location.
 2. Directional Arrows: As indicated or as required for the installed location.
- B. Self-Powered Exit Signs:
 1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 2. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 3. Provide low-voltage disconnect to prevent battery damage from deep discharge.
 4. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
- C. Self-Luminous Exit Signs: Internally illuminated by tritium gas sealed inside phosphor lined gas tubes, requiring no electrical power to operate, with a service life of 20 years unless otherwise indicated.

- D. Accessories:

1. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
 2. Provide compatible accessory wire guards where indicated.
- E. Manufacturers: Furnish products as indicated in Lighting Fixture Schedule included on the Drawings
- F. Exit Signs: Exit sign fixture suitable for use as emergency lighting unit.
1. Provide fixtures complying with NFPA 101.
 2. Lamps: Compact fluorescent.
 3. Directional Arrows: Universal type for field adjustment.
 4. Mounting: As indicated.
 5. Battery: 6 or 12 volt, nickel-cadmium type, with 1.5 hour capacity.
 6. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
 7. Lamps: Manufacturer's standard.

2.6 BALLASTS

- A. Manufacturers:
1. General Electric Company/GE Lighting; www.gelighting.com.
 2. Osram Sylvania; www.sylvania.com.
 3. Philips Lighting Electronics/Advance; www.advance.philips.com.
 4. Manufacturer Limitations: Where possible, for each type of luminaire provide ballasts produced by a single manufacturer.
 5. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.
- B. All Ballasts:
1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- C. Fluorescent Ballasts:

1. All Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
 - a. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
 - b. Total Harmonic Distortion: Not greater than 20 percent.
 - c. Power Factor: Not less than 0.95.
 - d. Ballast Factor: Normal ballast factor between 0.85 and 1.15, unless otherwise indicated.
 - e. Thermal Protection: Listed and labeled as UL Class P, with automatic reset for integral thermal protectors.
 - f. Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
 - g. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
 - h. Lamp Operating Frequency: Greater than 20 kHz, except as specified below.
 - i. Lamp Current Crest Factor: Not greater than 1.7.
 - j. Lamp Wiring Method:
 - 1) Instant Start Ballasts: Parallel wired.
 - 2) Rapid Start Ballasts: Series wired.
 - 3) Programmed Start Ballasts: Provide parallel or series/parallel wired where available; otherwise series wired is acceptable.
 - k. Provide automatic restart capability to restart replaced lamp(s) without requiring resetting of power.
 - l. Provide end of lamp life automatic shutdown circuitry for T5 and smaller diameter lamp ballasts.
 - m. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
 - n. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 18, for Class A, non-consumer application.
 - o. Ballast Marking: Include wiring diagrams with lamp connections.
2. Non-Dimming Fluorescent Ballasts:

- a. Lamp Starting Method:
 - 1) T8 Lamp Ballasts: Instant start unless otherwise indicated.
 - 2) T5 Lamp Ballasts: Programmed start unless otherwise indicated.
 - 3) Compact Fluorescent Lamp Ballasts: Programmed start unless otherwise indicated.
3. Dimming Fluorescent Ballasts:
 - a. Dimming Range: Continuous dimming from 100 percent to five percent relative light output, without flicker and with even tracking across multiple lamps.
 - b. Control Compatibility: Fully compatible with the dimming controls to be installed.
 - 1) Wall Dimmers: See Section 262726.
 - 2) Daylighting Controls: See Section 260923.
 - c. Lamp Starting Method: Programmed start unless otherwise indicated.
 - d. Dimmed Lamp Starting: Capable of starting lamp(s) at any dimmed preset without transitioning first to full light output.
4. Bi-Level Stepped Dimming Linear Fluorescent Ballasts:
 - a. Bi-Level Operation: Capable of being switched between full light output on all lamps, 50 percent of full light output on all lamps, and all lamps off.
 - b. Control Compatibility: Capable of being controlled by standard manual light switches or occupancy sensors unless otherwise indicated.
 - c. Lamp Starting Method: Programmed start unless otherwise indicated.
- D. High Intensity Discharge (HID) Ballasts: Complying with ANSI C82.4 and listed and labeled as complying with UL 1029.
 1. Electronic Metal Halide Ballasts:
 - a. All Electronic Metal Halide Ballasts:
 - 1) Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
 - 2) Total Harmonic Distortion: Not greater than 15 percent.
 - 3) Power Factor: Not less than 0.90.
 - 4) Provide thermal protection with automatic reset.

- 5) Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
- 6) Lamp Operating Frequency: Less than 200 Hz or as required to avoid acoustic resonance in lamp arc tube.
- 7) Lamp Current Crest Factor: Not greater than 1.5.
- 8) Provide end of lamp life automatic shutdown circuitry.
- 9) Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
- 10) Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 18, for Class A, non-consumer application.

2.7 FLUORESCENT EMERGENCY POWER SUPPLY UNITS

A. Manufacturers:

1. Iota Engineering, LLC; www.iotaengineering.com.
2. Lithonia Lighting; www.lithonia.com.
3. Philips Emergency Lighting/Bodine; www.bodine.com.

B. Description: Self-contained fluorescent emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

C. Compatibility:

1. Ballasts: Compatible with electronic, standard magnetic, energy saving, and dimming AC ballasts, including those with end of lamp life shutdown circuits.
2. Lamps: Compatible with low-mercury lamps.

D. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the fluorescent emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

E. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.

F. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.

- G. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status and field selectable audible alert.
- H. Fluorescent Ballasts: ANSI C82.1, high power factor type electromagnetic ballast, suitable for lamps specified.
 - 1. Certify fluorescent ballast design and construction by Certified Ballast Manufacturers, Inc.
 - 2. Substitutions: See Section 01 25 13 - Product Requirements.
- I. High Intensity Discharge (HID) Ballasts: ANSI C82.4, metal halide lamp ballast, suitable for lamp specified.
 - 1. Substitutions: See Section 01 25 13 - Product Requirements.
 - 2. Lamps: Suitable for lamp type and quantity specified for luminaire.
 - 3. Product:

2.8 LAMPS

- A. Manufacturers: Oram-Sylvania, Philip or General Electric. Supply lamps by one manufacturer only.
 - 1. Substitutions: See Section 016000 - Product Requirements.
- B. All Lamps:
 - 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
 - 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
 - 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 - 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the LP Consulting Engineers to be inconsistent in perceived color temperature.
- C. Compact Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
 - 1. Low Mercury Content: Provide lamps that pass the EPA Toxicity Characteristic Leaching Procedure (TCLP) test for characteristic hazardous waste.
 - 2. Correlated Color Temperature (CCT): 3,500 K unless otherwise indicated.

3. Color Rendering Index (CRI): Not less than 80.
 4. Average Rated Life: Not less than 10,000 hours for an operating cycle of three hours per start.
- D. Linear Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
1. Low Mercury Content: Provide lamps that pass the EPA Toxicity Characteristic Leaching Procedure (TCLP) test for characteristic hazardous waste.
 2. T8 Linear Fluorescent Lamps:
- E. Lamp Types: As specified for each fixture.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).
- F. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- G. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- H. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- I. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- J. Exposed Grid Ceilings: Support surface mounted luminaires in grid ceiling directly from building structure.
- K. Install recessed luminaires to permit removal from below.

- L. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- M. Install clips to secure recessed grid-supported luminaires in place.
- N. Install wall mounted luminaires and exit signs at height as indicated on Drawings.
- O. Install accessories furnished with each luminaire.
- P. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within fixture; use flexible conduit.
- Q. Connect luminaires and exit signs to branch circuit outlets provided under Section 260537 using flexible conduit.
- R. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- S. Bond products and metal accessories to branch circuit equipment grounding conductor.
- T. Install specified lamps in each exit sign and luminaire.
- U. Fluorescent Luminaires Controlled by Dual-Level Switching: Connect such that each switch controls the same corresponding lamps in each luminaire.
- V. Exit Signs:
- W. Fluorescent Emergency Power Supply Units:
- X. Install lamps in each luminaire.
- Y. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

3.2 FIELD QUALITY CONTROL

- A. See Section 01 45 00 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection in accordance with Section 01 45 00.
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

- F. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by LP Consulting Engineers.

3.3 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by LP Consulting Engineers. Secure locking fittings in place.
- B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by LP Consulting Engineers or authority having jurisdiction.
- C. Aim and adjust fixtures as indicated.
- D. Position exit sign directional arrows as indicated.

3.4 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean finishes and touch up damage.

3.5 PROTECTION

- A. Relamp luminaires that have failed lamps at Substantial Completion.

3.6 SCHEDULE - SEE DRAWINGS

END OF SECTION 26 51 00

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Exterior luminaires.
- B. Ballasts.
- C. Lamps.
- D. Poles and accessories.
- E. Luminaire accessories.

1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260537 - Boxes.
- D. Section 260923 - Lighting Control Devices: Automatic controls for lighting including outdoor motion sensors, time switches, and outdoor photo controls.

1.3 REFERENCE STANDARDS

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns
- B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast
- C. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type)
- D. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; Consolidated

- E. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing
- F. IEEE C2 - National Electrical Safety Code
- G. IESNA LM-5 - Photometric Measurements of Area and Sports Lighting Installations
- H. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information
- I. IESNA LM-64 - Photometric Measurements of Parking Areas
- J. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association
- K. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems
- L. NFPA 70 - National Electrical Code; National Fire Protection Association, 2020 with California amendments, CEC 2019.
- M. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.
- N. UL 1029 - High-Intensity-Discharge Lamp Ballasts; Current Edition, Including All Revisions.
- O. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- P. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
 - 2. Notify the Architect and/or the District Representative of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Coordination: Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IESNA LM-63 standard format upon request.
 - 2. Lamps: Include rated life and initial and mean lumen output.
 - 3. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.
- D. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.
- E. Field Quality Control Reports.
 - 1. Include test report indicating measured illumination levels.
- F. Test Reports: Indicate measured illumination levels.
- G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- H. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- I. Maintenance Materials: Furnish the following for District's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
- J. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of CEC 2019.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. **Manufacturer Qualifications:** Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. **Electrical Components:** Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 - PRODUCTS

2.1 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the Drawings.

2.2 LUMINAIRES

- A. Provide products that comply with requirements of CEC 2019.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary

for a complete operating system.

- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
- H. HID Luminaires:
 - 1. HID Luminaires with Quartz Restrike Systems: Factory-installed supplementary quartz lamp automatically switches on when power interruption causes primary HID lamp to drop out or during cold startup.
- I. LED Luminaires: Listed and labeled as complying with UL 8750.

2.3 BALLASTS

- A. Manufacturers:
 - 1. General Electric Company/GE Lighting; www.gelighting.com.
 - 2. Osram Sylvania; www.sylvania.com.
 - 3. Philips Lighting Electronics/Advance; www.advance.philips.com.
 - 4. Or equal.
 - 5. Manufacturer Limitations: Where possible, for each type of luminaire provide ballasts produced by a single manufacturer.
 - 6. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.
- B. All Ballasts:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- C. High Intensity Discharge (HID) Ballasts: Unless otherwise indicated, provide electromagnetic ballasts complying with ANSI C82.4 and listed and labeled as complying with UL 1029.
 - 1. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 5 percent.
 - 2. Power Factor: Not less than 0.90 unless otherwise indicated.
- D. Fluorescent Ballasts: ANSI C82.1, high power factor type electromagnetic ballast, suitable for lamps specified.
 - 1. Provide low-temperature ballast suitable for lamps specified.
 - 2. Certify fluorescent ballast design and construction by Certified Ballast Manufacturers, Inc.

- E. High Intensity Discharge (HID) Ballasts: ANSI C82.4, metal halide lamp ballast, suitable for lamp specified.

2.4 LAMPS

- A. Manufacturers:
1. General Electric Company/GE Lighting; www.gelighting.com.
 2. Osram Sylvania; www.sylvania.com.
 3. Philips Lighting Company; www.lighting.philips.com.
 4. Manufacturer Limitations: Where possible, provide lamps produced by a single manufacturer.
 5. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.
- B. All Lamps:
1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the LP Consulting Engineers to be inconsistent in perceived color temperature.
- C. Compact Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
1. Low Mercury Content: Provide lamps that pass the EPA Toxicity Characteristic Leaching Procedure (TCLP) test for characteristic hazardous waste.
 2. Correlated Color Temperature (CCT): 3,500 K unless otherwise indicated.
 3. Color Rendering Index (CRI): Not less than 80.
 4. Average Rated Life: Not less than 10,000 hours for an operating cycle of three hours per start.
- D. Linear Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
1. Low Mercury Content: Provide lamps that pass the EPA Toxicity Characteristic Leaching Procedure (TCLP) test for characteristic hazardous waste.
 2. T8 Linear Fluorescent Lamps:
 - a. Correlated Color Temperature (CCT): 4,100 K unless otherwise indicated.
 - b. Color Rendering Index (CRI): Not less than 80.
 - c. Average Rated Life: Not less than 20,000 hours for an operating cycle

- of three hours per start.
3. T5 Linear Fluorescent Lamps:
 - a. Correlated Color Temperature (CCT): 4,100 K unless otherwise indicated.
 - b. Color Rendering Index (CRI): Not less than 80.
 - c. Average Rated Life: Not less than 20,000 hours for an operating cycle of three hours per start.
 - E. High Intensity Discharge (HID) Lamps: Wattage as indicated, with bulb type, burning position, and base type as required for luminaire.
 1. Metal Halide Lamps:
 - a. Non-Reflector Type Metal Halide Lamps: Clear lamp finish unless otherwise indicated.
 - b. Provide ANSI type O-rated protected metal halide lamps where required for open luminaires provided with compatible exclusionary sockets.
 - c. Ceramic Metal Halide Lamps:
 - 1) Correlated Color Temperature (CCT): 4,000 K unless otherwise indicated.
 - 2) Color Rendering Index (CRI): Not less than 80.
 - F. Lamp Types: As specified for each luminaire.

2.5 POLES

- A. All Poles:
 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
 2. Material: Steel, unless otherwise indicated.
 3. Shape: Square straight, unless otherwise indicated.
 4. Finish: Match luminaire finish, unless otherwise indicated.
 5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
 6. Unless otherwise indicated, provide with the following features/accessories:
 - a. Top cap.
 - b. Handhole.
 - c. Anchor bolts with leveling nuts or leveling shims.
 - d. Anchor base cover.
 - e. Provision for pole-mounted weatherproof GFI receptacle where indicated.
- B. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with CEC 2019.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- F. Pole-Mounted Luminaires:
 - 1. Maintain the following minimum clearances:
 - a. Comply with IEEE C2.
 - b. Comply with utility company requirements.
 - 2. Foundation-Mounted Poles:
 - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 033000.
 - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
 - 2) Position conduits to enter pole shaft.
 - b. Install foundations plumb.
 - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
 - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
 - e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
 - f. Install anchor base covers or anchor bolt covers as indicated.

3. Embedded Poles: Install poles plumb as indicated.
 4. Grounding:
 - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
 5. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- I. Provide concrete bases for lighting poles at locations indicated, in accordance with detail on drawing and Section 033000.
- J. Install poles plumb.
 1. Provide shims to adjust plumb.
 2. Grout around each base.
- K. Install lamps in each luminaire.
- L. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor. Provide supplementary grounding electrode at each pole.

3.3 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection, testing, and adjusting in accordance with Section 014000.
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by LP Consulting Engineers.
- F. Measure illumination levels at night with calibrated meters to verify conformance with performance requirements. Record test results in written report to be included with submittals.
 1. Test according to IESNA LM-64 (parking areas).
- G. Measure illumination levels to verify conformance with performance requirements. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.4 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by LP Consulting Engineers. Secure locking fittings in place.
- B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by LP Consulting Engineers.

3.5 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean finishes and touch up damage.

3.6 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of luminaires to the Architect and/or District Representative, and correct deficiencies or make adjustments as directed.
- D. Just prior to Substantial Completion, replace all lamps that have failed.

3.7 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

3.8 SCHEDULE - SEE DRAWINGS

END OF SECTION 26 56 00

SECTION 270500
COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Communications equipment coordination and installation.
 - 2. Sleeves for pathways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common communications installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of communications equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR PATHWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - 3. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of pathway or cable.
 - 4. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 5. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.
- F. System Supported: The Data infrastructure is intended to support data network communications from the equipment in the data room (Switch) to the work area equipment (Desktop Computer) and between equipment in datacom rooms (MDF/ IDF). The data network will support at minimum, I based host client protocols and voice over internet protocols. The datacom infrastructure, particularly the fiber backbone, can support additional systems such as security, controls and fire alarm.

3.2 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.

- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and pathway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- L. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between pathway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 270500

SECTION 271005
STRUCTURED CABLING FOR VOICE AND DATA - INSIDE PLANT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Telecommunications service entrance to building(s).
- B. Cabling and pathways inside building(s).
- C. Cabling and pathways connecting building(s).
- D. Distribution frames, cross-connection equipment, enclosures, and outlets.
- E. Grounding and bonding the telecommunications distribution system.

1.2 RELATED REQUIREMENTS

- A. Section 337119 - Electrical Underground Ducts and Manholes.
- B. Section 078400 - Firestopping.
- C. Section 260526 - Grounding and Bonding for Electrical Systems: Electrical system grounding and bonding.
- D. Section 260534 - Conduit.
- E. Section 260537 - Boxes.
- F. Section 262726 - Wiring Devices.

1.3 REFERENCE STANDARDS

- A. EIA-310 - Cabinets, Racks, Panels, and Associated Equipment; Electronic Industries Association; Revision D, 1992.
- B. CEA-310 - Cabinets, Racks, Panels, and Associated Equipment; Consumer Electronics Association; Revision E, 2005.
- C. ICEA S-90-661 - Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use in General Purpose and LAN Communications Wiring Systems; Insulated Cable Engineers Association; 2002.

- D. NFPA 70 - National Electrical Code, 2005 with 2019 California Electrical Code amendments.
- E. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; Rev A, 1988(R 2002).
- F. TIA-492AAAA - Detail Specification for 62.5-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; Revision A, 1997 (R 2002).
- G. TIA-492AAAB - Detail Specification for 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 1998 (R 2002).
- H. TIA-492CAAA - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers; 1998 (R 2002).
- I. TIA-526-7 - OFSTP-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant; 2002.
- J. TIA-526-14 - OFSTP-14 - Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant; Rev A, 1998(R2003).
- K. TIA/EIA-568-B.1 - Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements; Rev B, 2001; Addenda 1-7.
- L. TIA/EIA-568-B.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components; Rev B, 2001; Addenda 1-11.
- M. TIA/EIA-568-B.3 - Commercial Building Telecommunications Cabling Standard - Part 3: Optical Fiber Cabling Components Standard, and Addendum 1 - Additional Transmission Performance Specifications for 50/125 um Optical Fiber Cables; Rev B, 2000; Addendum 1.
- N. TIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces; 2009.
- O. TIA/EIA-606 - Administration Standard for the Telecommunications Infrastructure; Rev A, 2002.
- P. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A, 2002.
- Q. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- R. UL 497 - Standard for Protectors for Paired-Conductor Communications Circuits; Current Edition, Including All Revisions.

- S. UL 514C - Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- T. UL 1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords; Current Edition, Including All Revisions.
- U. UL 1863 - Standard for Communications-Circuit Accessories; Current Edition, Including All Revisions.
- V. USDA RUS 345-83 - Gas Tube Surge Arrestors (PE-80); US Department of Agriculture; 1982.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Installation methods.
- C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
- D. Manufacturer Qualifications. Manufacturer is Panduit and installer shall be certified by Panduit (PCI) and cover project warranty under the Panduit Certification Plus System
- E. Installer Qualifications. The structured system installer shall have a current and active contractors license, either a C7 or C10 level, in the State of California
- F. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.
- G. Field Test Reports.
- H. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
 - 1. Record actual locations of outlet boxes and distribution frames.
 - 2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
 - 3. Identify distribution frames and equipment rooms by room number on contract drawings.
- I. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.
- J. Owner Provided Equipment

1. PCCD District IT Department will design, procure and install the data network equipment (Switches).

Space in the racks or cabinets shall be designed to allow for the network equipment and patch cords to be installed. Obtain from PCCD IT rack requirements.

2. PCCD District IT Department will design, procure and install the telephone equipment (Telephones)

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified (Panduit).
- B. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
 - 1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
 - 2. Supervisors and installers factory certified by manufacturers of products to be installed.
 - 3. Employing experienced technicians for all work; show at least 3 years experience in the installation of the type of system specified, with evidence from at least 2 projects that have been in use for at least 18 months; submit project name, address, and written certification by user.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

1.7 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a 2 year period after Date of Substantial Completion.
- C. Provide 25 Year Panduit Manufacturer's Warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Cabling and Equipment:
 - 1. Panduit

2.2 SYSTEM DESIGN

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
 - 1. Comply with TIA/EIA-568 and TIA/EIA-569, latest editions.

2. Provide fixed cables and pathways that comply with NFPA 70 and ANSI/J-STD-607 and are UL listed or third party independent testing laboratory certified.
3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.

B. Capacity:

1. Building Entrance: _____ pairs, backbone cable.
2. Backbones: _____ pairs, copper.
 - a. Provide optical fiber backbone cabling between buildings and copper backbone cabling within buildings.
3. Horizontal Cabling: Copper.
4. Offices and Work Areas: Provide one voice outlet and one data outlet in each work area, unless noted otherwise or as shown on plan.
5. Classrooms: voice and data outlets as shown on plan.
6. Provide additional outlets where indicated on drawings.

C. Main Distribution Frame (MDF): Centrally located support structure for terminating backbone cables, functioning as point of presence to external service provider.

1. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.

D. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.

1. Locate intermediate distribution frames as indicated on the drawings.

E. Backbone Cabling: Cabling, pathways, and terminal hardware connecting intermediate distribution frames (IDF's) with main distribution frame (MDF), wired in star topology with main distribution frame at center hub of star.

F. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.3 PATHWAYS

- A. Conduit: As specified in Section 260534; provide pull cords in all conduit.
- B. Underground Service Entrance: PVC, Type EPC-40 conduit.

2.4 COPPER CABLE AND TERMINATIONS

- A. Copper Backbone Cable: TIA/EIA-568 Category 6 solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 100 pairs formed into 25-pair binder groups; covered with gray thermoplastic jacket and complying with all relevant parts of and addenda to latest editions of TIA/EIA-568 and ICEA S-90-661, and UL 444.

1. In locations other than in plenums, provide NFPA 70 type CMR riser-rated or type CMP plenum-rated cable.
 2. In plenums, provide NFPA 70 type CMP plenum-rated cable.
 3. Provide cable having conductors twisted at minimum rate of two per foot; actual length and frequency of twists at manufacturer's option.
 4. Color code conductors in accordance with ICEA S-90-661.
 5. Testing: Furnish factory reel tests.
- B. Copper Horizontal Cable: TIA/EIA-568 Category 6A solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 4 individually twisted pairs; covered with blue jacket and complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.
1. In locations other than in plenums, provide NFPA 70 type CMG general purpose, CMR riser-rated, or type CMP plenum-rated cable.
 2. In plenums, provide NFPA 70 type CMP plenum-rated cable.
 3. Testing: Furnish factory reel tests.
- C. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- D. Jacks and Connectors: RJ-45, non-keyed, terminated with 110-style insulation displacement connectors; high impact thermoplastic housing; complying with same standard as specified horizontal cable and UL 1863.
1. Performance: 500 mating cycles.
 2. Voice and Data Jacks: 4-pair, pre-wired to T568A configuration, with color-coded indications for T568B configuration.

2.5 FIBER OPTIC CABLE AND ADAPTORS

- A. Fiber Optic Backbone Cable: 24-fiber, multimode 50/125 um, complying with TIA-492AAAB; covered with orange cable jacket and complying with relevant portions of and addenda to latest edition of TIA/EIA-568.
1. In locations other than in plenums, provide NFPA 70 type OFNR nonconductive-riser-rated or type OFNP nonconductive-plenum-rated cable.
 2. In plenums, provide NFPA 70 type OFNP nonconductive-plenum-rated cable.
 3. Testing: Furnish factory reel tests.
- B. Fiber Optic Horizontal Cable: Two-fiber, multimode 50/125 um, complying with TIA-492AAAB; covered with orange single jacket and complying with relevant portions of and addenda to latest edition of TIA/EIA-568.
1. In locations other than in plenums, provide NFPA 70 type OFN nonconductive general purpose, OFNR nonconductive-riser-rated, or type OFNP nonconductive-plenum-rated cable.
 2. In plenums, provide NFPA 70 type OFNP nonconductive-plenum-rated cable.
 3. Testing: Furnish factory reel tests.
- C. Fiber Optic Adapters and Connectors: Duplex SC, push-on-push-off type, multimode adaptors with zirconia ceramic alignment sleeves; complying with relevant parts and addenda to latest

edition of TIA/EIA-568 and with maximum attenuation of 0.3 dB at 1300 nm with less than 0.2 dB change after 500 mating cycles when tested in accordance with TIA-455-21.

- D. Fiber Optic Connectors: SC type, bayonet twist-on-off, multimode adaptors with metallic alignment sleeves; maximum attenuation of 0.3 dB at 1300 nm with less than 0.2 dB change after 500 mating cycles when tested in accordance with TIA-455-21.

2.6 CROSS-CONNECTION EQUIPMENT

- A. Connector Blocks for Category 5e and Up Cabling: Type 110 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.
- B. Patch Panels for Copper Cabling: Sized to fit EIA standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
1. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
 2. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
 3. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
 4. Provide incoming cable strain relief and routing guides on back of panel.
 5. Patch Cords: Provide one patch cord for each pair of patch panel ports.
- C. Patch Panels for Fiber Optic Cabling: Sized to fit EIA standard 19 inch wide equipment racks; 0.09 inch thick aluminum.
1. Adaptors: As specified above under FIBER OPTIC CABLING; maximum of 24 duplex adaptors per standard panel width.
 2. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
 3. Provide incoming cable strain relief and routing guides on back of panel.
 4. Provide rear cable management tray at least 8 inches deep with removable cover.
 5. Provide dust covers for unused adaptors.
 6. Patch Cords: Provide one patch cord for each pair of patch panel ports.

2.7 ENCLOSURES

- A. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
1. Size: As indicated on drawings.
 2. Do not paint over UL label.
- B. Equipment Racks and Cabinets:
1. Provide in each IDF a wall mounted lockable cabinet. Provide a 19”X54”X18 wall swing cabinet (Black)
- C. Building Entrance Protector: Factory fabricated panel to connect incoming cable and interior cable to protector modules.

1. Capacity: One protector module per pair in incoming cable.
 2. Protector Modules: Type rated for the application.
 - a. Solid State Type: Complying with UL 497.
 3. Incoming Side: Provide cable stub of same type as backbone cabling factory connected to protector module socket blocks.
 4. Outgoing Side (to Interior): Backbone cable wired to connector blocks.
- D. Outlet Boxes: For flush mounting in walls; depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
1. Size, Unless Otherwise Indicated: 4 inches square by 2-1/8 inches deep.
 2. Wall-Mounted Telephones: 4 inches high by 2 inches wide by 2-1/8 inches deep.
 3. Boxes for Fiber Optic Outlets: Single or two gang as indicated.
 - a. Size: 4-11/16 inches square by 2-1/8 inches deep.
 4. Faceplates: High impact thermoplastic, complying with system design standards and UL 514C.
 5. Labels: Comply with TIA/EIA-606 using encoded identifiers; label each jack on the face plate as to its function with a unique numerical identifier.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- A. Comply with latest editions and addenda of TIA/EIA-568, TIA/EIA-569, ANSI/J-STD-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- B. Comply with latest editions and addenda of TIA-570, ANSI/J-STD-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

3.2 PATHWAYS

- A. Underground Service Entrance: Install conduit at least 18 inches below finish grade; encase in at least 3 inches thick concrete for at least 60 inches out from the building line.
- B. Install with the following minimum clearances:
 1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
 2. 12 inches from power conduits and cables and panelboards.
 3. 5 inches from fluorescent and high frequency lighting fixtures.
 4. 6 inches from flues, hot water pipes, and steam pipes.
- C. Conduit:
 1. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
 2. Leave pull cords in place where cables are not initially installed.
 3. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
 - a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and

- telecommunications rooms.
 - b. Treat conduit in crawl spaces and under floor slabs as if exposed to view.
 - c. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.
 - d. Under floor slabs, locate conduit at 12 inches, minimum, below vapor retarder; seal penetrations of vapor retarder around conduit.
- D. Outlet Boxes:
- 1. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of telecommunications outlets provided under this section.
 - a. Mounting Heights: Unless otherwise indicated, as follows:
 - 1) Telephone and Data Outlets: 18 inches above finished floor.
 - 2) Telephone Outlets for Side-Reach Wall-Mounted Telephones: 54 inches above finished floor to top of telephone.
 - 3) Telephone Outlets for Forward-Reach Wall-Mounted Telephones: 48 inches above finished floor to top of telephone.
 - b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - c. Provide minimum of 24 inches horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
 - d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
 - e. Locate outlet boxes so that wall plate does not span different building finishes.
 - f. Locate outlet boxes so that wall plate does not cross masonry joints.
- E. Grounding and Bonding: Perform in accordance with ANSI/J-STD-607 and NFPA 70.
- F. Firestopping: Seal openings around pathway penetrations through fire-rated walls, partitions, floors, and ceilings in accordance with Section 078413.

3.3 INSTALLATION OF EQUIPMENT AND CABLING

- A. Cabling:
- 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
 - 2. Do not over-cinch or crush cables.
 - 3. Do not exceed manufacturer's recommended cable pull tension.
 - 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
- 1. At Distribution Frames: 120 inches.
 - 2. At Outlets - Copper: 12 inches.
 - 3. At Outlets - Optical Fiber: 39 inches.
- C. Copper Cabling:

1. Category 6A: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
 2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
 3. Copper Cabling Not in Conduit: Use only type CMP plenum-rated cable as specified.
- D. Fiber Optic Cabling:
1. Prepare for pulling by cutting outer jacket for 10 inches from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
 2. Support vertical cable at intervals as recommended by manufacturer.
- E. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.
- F. Field-Installed Labels: Comply with TIA/EIA-606 using encoded identifiers.
1. Cables: Install color coded labels on both ends.
 2. Outlets: Label each jack on its face plate as to its type and function, with a unique numerical identifier.
 3. Patch Panels: Label each jack as to its type and function, with a unique numerical identifier.
 4. Patch Cords: Label with jack identifier corresponding to initial installation.

3.4 FIELD QUALITY CONTROL

- A. Comply with inspection and testing requirements of specified installation standards.
- B. Visual Inspection:
1. Inspect cable jackets for certification markings.
 2. Inspect cable terminations for color coded labels of proper type.
 3. Inspect outlet plates and patch panels for complete labels.
 4. Inspect patch cords for complete labels.
- C. Testing - Copper Cabling and Associated Equipment:
1. Test backbone cables after termination but before cross-connection.
 2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
 3. Test operation of shorting bars in connection blocks.

4. Category 6A Backbone: Perform near end cross talk (NEXT) and attenuation tests.
 5. Category 6A Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.
- D. Testing - Fiber Optic Cabling:
1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
 2. Multimode Backbone: Perform tests in accordance with TIA/EIA-526-14 Method B.
 3. Links: Perform optical fiber end-to-end attenuation tests and field reel tests.
- E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION 271005

SECTION 271500
COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

- A. Section Includes:
1. Pathways.
 2. UTP cabling.
 3. Coaxial cable.
 4. Multiuser telecommunications outlet assemblies.
 5. Cable connecting hardware, patch panels, and cross-connects.
 6. Telecommunications outlet/connectors.
 7. Cabling system identification products.
 8. Cable management system.
- B. Related Sections:
1. Division 27 Section "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
 2. Division 28 Section "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International
- B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
- C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- D. EMI: Electromagnetic interference.
- E. IDC: Insulation displacement connector
- F. LAN: Local area network.

- G. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.
- H. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- I. RCDD: Registered Communications Distribution Designer.
- J. UTP: Unshielded twisted pair

1.4 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.
 - 1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
 - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
 - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
 - 4. Splitters shall not be installed as part of the optical fiber cabling.
- B. A work area is approximately 100 sq. ft. (9.3 sq. m), and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment. The maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) in the horizontal cross-connect.

1.5 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Retain subparagraph below for coaxial cable. Installation data for UTP and optical fiber cabling are specified in the referenced TIA/EIA standards.
1. For coaxial cable, include the following installation data for each type used:
 - a. Nominal OD.
 - b. Minimum bending radius.
 - c. Maximum pulling tension.
- C. Shop Drawings:
- D. Retain one of first two subparagraphs below.
1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 3. Cabling administration drawings and printouts.
 4. Wiring diagrams to show typical wiring schematics, including the following:
 - a. Cross-connects.
 - b. Patch panels.
 - c. Patch cords.
 5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
 6. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
 - a. Vertical and horizontal offsets and transitions.
 - b. Clearances for access above and to side of cable trays.
 - c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
 - d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.
 - e. Retain first paragraph below when workstation outlet faceplates have critical features needing hands-on appraisal.
 - f. Remaining paragraphs are defined in Division 01 Section "Submittal Procedures" as "Informational Submittals."
 - g. Coordinate first paragraph below with qualification requirements in Division 01 Section "Quality Requirements" and as supplemented in "Quality Assurance" Article.
- E. Qualification Data: For [Installer,]qualified layout technician, installation supervisor, and field inspector.
- F. Source quality-control reports.
- G. Retain first paragraph below if Contractor is responsible for field quality-control testing and inspecting.
- H. Maintenance Data: For splices and connectors to include in maintenance manuals.
- I. Retain paragraph below for PC-based cabling administration systems.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings[and Cabling Administration Drawings][, Cabling Administration Drawings, and field testing program development] by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of [Registered Technician] [Level 2 Installer], who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Delete subparagraph below if Contractor performs field quality control.
 - 4. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
 - 5. Retain first paragraph below if Contractor or manufacturer selects testing agency or if Contractor is required to provide services of a qualified testing agency in "Field Quality Control" Article. Qualification requirements are in addition to those specified in Division 01 Section "Quality Requirements," which also includes the definition for "NRTL" (nationally recognized testing laboratory).

- B. Testing Agency Qualifications: An NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: [25] <Insert value> or less.
 - 2. Smoke-Developed Index: [50] [450] <Insert value> or less.

- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- E. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.

- F. Grounding: Comply with ANSI-J-STD-607-A.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.

- B. Retain one or both of first two subparagraphs below.
 - 1. Test optical fiber cables to determine the continuity of the strand end to end. Use [optical fiber flashlight] [or] [optical loss test set] <Insert test>.
 - 2. Test optical fiber cables while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; including the loss value of each. Retain test data and include the record in maintenance data.
 - 3. Test each pair of UTP cable for open and short circuits.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.
- C. Services in this article may not be allowed for publicly funded projects.
- D. Retain this article for computer-based, special-purpose cabling administration software.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. General Requirements: Comply with TIA/EIA-569-A.
- B. Retain first paragraph below if cable support brackets are used in communications equipment room.
- C. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.
- D. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used, no exceptions..
 - 1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Belden CDT Inc.; Electronics Division.
 - 2. CommScope, Inc.
 - 3. Superior Essex Inc.
- B. Description: 100-ohm, 4-pair UTP, formed into 25-pair, binder groups covered with a blue thermoplastic jacket.
 - 1. Comply with ICEA S-90-661 for mechanical properties.
 - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
 - 3. Comply with TIA/EIA-568-B.2, Category 6.
 - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - a. Communications, General Purpose: Type CM or CMG[; or MPP, CMP, MPR, CMR, MP, or MPG].
 - b. Communications, Plenum Rated: Type CMP[or MPP], complying with NFPA 262.
 - c. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.

2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hubbell Premise Wiring.
 - 2. Leviton Voice & Data Division.
 - 3. Panduit Corp.
- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 spare. Integral with connector bodies, including plugs and jacks where indicated.
- D. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

- E. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals..
- F. Patch Cords: Factory-made, four-pair cables in 48-inch lengths; terminated with eight-position modular plug at each end.
 - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
 - 2. Patch cords shall have color-coded boots for circuit identification.

2.5 OPTICAL FIBER CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Berk-Tek; a Nexans company.
 - 2. General Cable Technologies Corporation.
 - 3. Superior Essex Inc.
- B. Description: Multimode, 562.5/125-micrometer, 24-fiber, tight buffer, optical fiber cable.
 - 1. Comply with ICEA S-83-596 for mechanical properties.
 - 2. Comply with TIA/EIA-568-B.3 for performance specifications.
 - 3. Comply with [TIA/EIA-492AAAA-B] [TIA/EIA-492AAAA-A] for detailed specifications.
 - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - a. General Purpose, Nonconductive: Type OFN or OFNG.
 - b. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
 - c. Riser Rated, Nonconductive: Type OFNR, complying with UL 1666.
 - 5. Conductive cable shall be [steel] [aluminum] armored type.
 - 6. Maximum Attenuation: [3.50] dB/km at 850 nm.
 - 7. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
- C. Jacket:
 - 1. Jacket Color: Aqua for 50/125-micrometer cable, Orange for 62.5/125-micrometer cable .
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

2.6 OPTICAL FIBER CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Technology Systems Industries, Inc.
 - 2. Berk-Tek; a Nexans company.
 - 3. Dynacom Corporation.

- B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.

- C. Coordinate subparagraph below with Drawings for quantity of connectors.
 - 1. Number of Connectors per Field: [One] <Insert number> for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

- D. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths.

- E. Cable Connecting Hardware:
 - 1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
 - 2. Quick-connect, simplex and duplex, Type LC connectors. Insertion loss not more than 0.75 dB.
 - 3. Type SFF connectors may be used in termination racks, panels, and equipment packages.

2.7 COAXIAL CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alpha Wire Company.
 - 2. Belden CDT Inc.; Electronics Division.
 - 3. CommScope, Inc.

- B. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.

- C. RG-11/U: NFPA 70, Type CATV.
 - 1. No. 14 AWG, solid, copper-covered steel conductor.
 - 2. Gas-injected, foam-PE insulation.
 - 3. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
 - 4. Jacketed with sunlight-resistant, black PVC or PE.
 - 5. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus

85 deg C.

- D. RG-6/U: NFPA 70, Type CATV or CM.
 - 1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 - 2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
 - 3. Jacketed with black PVC or PE.
 - 4. Suitable for indoor installations.

- E. RG59/U (Plenum Rated): NFPA 70, Type CMP.
 - 1. No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
 - 2. Double shielded with 100 percent aluminum-foil shield and 65 percent aluminum braid.
 - 3. Copolymer jacket.

- F. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
 - 1. CATV Cable: Type CATV, or CATVP or CATVR.
 - 2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
 - 3. CATV Riser Rated: Type CATVR; or CATVP, CATVR, or CATV, complying with UL 1666.
 - 4. CATV Limited Rating: Type CATVX.

2.8 COAXIAL CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Aim Electronics; a brand of Emerson Electric Co.
 - 2. Leviton Voice & Data Division.
 - 3. Siemon Co. (The).

- B. Coaxial-Cable Connectors: Type BNC, 75 ohms.

2.9 CONSOLIDATIOIN POINTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Chatsworth Products, Inc.
 - 2. Hubbell Premise Wiring.
 - 3. Panduit Corp.

- B. Description: Consolidation points shall comply with requirements for cable connecting hardware.
1. Number of Terminals per Field: One for each conductor in assigned cables..
 2. Number of Connectors per Field:
 - a. One for each four-pair UTP cable indicated
 - b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
 3. Mounting: Recessed in ceiling, Wall.
 4. NRTL listed as complying with UL 50 and UL 1863.
 5. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

2.10 MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLY (MUTOA)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following::
1. Chatsworth Products, Inc.
 2. Hubbell Premise Wiring.
 3. Panduit Corp.
- B. Description: MUTOAs shall meet the requirements for cable connecting hardware
1. Number of Terminals per Field: One for each conductor in assigned cables.
 2. Coordinate first subparagraph below with Drawings for quantity of connectors.
 3. Number of Connectors per Field:
 - a. One for each four-pair UTP cable indicated.
 - b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
 4. Mounting: Recessed in ceiling, Wall.
 5. NRTL listed as complying with UL 50 and UL 1863.
 6. Label shall include maximum length of work area cords, based on TIA/EIA-568-B.1.
 7. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

2.11 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.
- B. Workstation Outlets: Four-port-connector assemblies mounted in [multigang faceplate.
1. Metal Faceplate: Stainless steel, complying with requirements in Division 26 Section "Wiring Devices."
 2. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.
 - b. Retain one of three subparagraphs below; retain first for metal faceplates.
 3. Legend: Factory labeled by silk-screening or engraving for stainless steel faceplates.

4. Legend: Machine printed, in the field, using adhesive-tape label.
5. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.12 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with ANSI-J-STD-607-A.

2.13 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.14 CABLE MANAGEMENT SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following;
- B. Basis-of-Design Product: Subject to compliance with requirements, comparable product by one of the following:
 1. iTRACS Corporation.
 2. Telsoft Solutions.
- C. Description: Computer-based cable management system, with integrated database and graphic capabilities.
- D. First paragraph below specifies identification that is integrated with database functions, testing, and graphics.
- E. Document physical characteristics by recording the network, TIA/EIA details, and connections between equipment and cable.
- F. Information shall be presented in database view, schematic plans, or technical drawings.
 1. AutoCAD drawing software shall be used as drawing and schematic plans software.
- G. System shall interface with the following testing and recording devices:
 1. Direct upload tests from circuit testing instrument into the personal computer.
 2. Direct download circuit labeling into labeling printer.

2.15 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.
- E. See Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.
- F. Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.
- G. Cable will be considered defective if it does not pass tests and inspections.
- H. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS.

- A. Wiring Method: Install cables in raceways except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF PATHWAYS

- A. Coordinate cable connection hardware installations and specialty arrangements with layout drawings and with requirements specified for communications equipment rooms. If Drawings are explicit enough, these requirements may be reduced or omitted.
- B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.
- C. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- D. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- E. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- F. Pathway Installation in Communications Equipment Rooms:
 - 1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
 - 2. Install cable trays to route cables if conduits cannot be located in these positions.
 - 3. Secure conduits to backboard when entering room from overhead.
 - 4. Extend conduits [3 inches (76 mm)] <Insert dimension> above finished floor.
 - 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.4 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Comply with TIA/EIA-568-B.1.
 - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - 3. Install 110-style IDC termination hardware unless otherwise indicated.
 - 4. MUTOA shall not be used as a cross-connect point.
 - 5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
 - a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
 - b. Locate consolidation points for UTP at least 49 feet (15 m) from communications equipment room.

6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
12. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
13. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:

1. Comply with TIA/EIA-568-B.3.
2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than [60 inches (1524 mm)] <Insert dimension> apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Outdoor Coaxial Cable Installation:

1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).

G. Group connecting hardware for cables into separate logical fields.

H. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice

- and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.7 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.
- C. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- D. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for [Class 2] [Class 3] [Class 4] level of administration[, including optional identification requirements of this standard].
- E. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

- F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, [backbone pathways and cables,] [entrance pathways and cables,] terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.
- G. Cable and Wire Identification:
1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
 4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
 - b. Label each unit and field within distribution racks and frames.
 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
 6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.
- H. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.8 FIELD QUALITY CONTROL.

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
 2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
 3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
5. Optical Fiber Cable Tests:
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - b. Link End-to-End Attenuation Tests:
 - 1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
 - 2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
6. UTP Performance Tests:
 - a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
 - 1) Wire map.
 - 2) Length (physical vs. electrical, and length requirements).
 - 3) Insertion loss.
 - 4) Near-end crosstalk (NEXT) loss.
 - 5) Power sum near-end crosstalk (PSNEXT) loss.
 - 6) Equal-level far-end crosstalk (ELFEXT).
 - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
 - 8) Return loss.
 - 9) Propagation delay.
 - 10) Delay skew.
7. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.3.
8. Retain first subparagraph below when cable is used for broadband closed-circuit television applications. Revise to suit tests to verify cable performance for other systems using coaxial cable.
9. Coaxial Cable Tests: Conduct tests according to Division 27 Section "Master Antenna Television System."
10. Final Verification Tests: Perform verification tests for UTP and optical fiber systems after the complete communications cabling and workstation outlet/connectors are installed.
 - a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
 - b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface

device at the demarcation point. Log onto the network to ensure proper connection to the network.

- C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- D. See Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train District's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets. Include training in cabling administration software.

END OF SECTION 271500

SECTION 27 30 10

ASSISTIVE LISTENING SYSTEM

PART 1 - GENERAL

1.1 CONTRACT PROVISIONS

- A. The requirements of this Section are in addition to the requirements of Division 1, General Conditions and Supplementary Conditions.

1.2 SECTION INCLUDES

- A. Furnish and install an Assistive Listening System in accordance with 2019 CBC, Chapter 11B, Section 11B-219 and Section 11B-219.5.

1.3 RELATED SECTIONS

- A. Section 260110 Basic Electrical Requirements

1.4 INCORPORATED DOCUMENTS

- A. Published specifications, standard, tests or recommended methods of trade, industry or governmental organizations apply to work in this Section when cited by abbreviation noted below.
 - 1. (CEC) - California Electrical Code - NFPA 70 2016 with 2019 edition with California Amendments.
 - 2. (ANSI)- American National Standard Institute.

3. (UL) - Underwriters' Laboratories.

B. When this Section or parts thereof are copies for use by subcontractors or supplier, applicable paragraphs of Section 260110 Basic Electrical Requirements shall also be copied and attached to those copies.

1.5 QUALITY ASSURANCE

A. Acceptable Manufacturers: Firms regularly engaged in manufacturer of Assistive Listening Systems and accessory equipment of type and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years. All materials shall comply with applicable standards of the Underwriter's Laboratories, Inc.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's data and accessory equipment specifications, installation and start up instructions, and capacity and ratings, with selection points clearly indicated.

B. Maintenance Data: Submit maintenance data and parts lists for each item and accessory equipment. Include "troubleshooting" maintenance guides. Include this data in maintenance manual.

1.7 DESCRIPTION

A. Work under this section includes all equipment, labor and materials necessary to furnish and install a complete assistive listening system.

B. The Assistive Listening System shall be an FM wireless system.

- C. Each system shall be complete consisting of transmitter, receivers, earphones, microphone, etc. as required.
- D. Features:
1. No seating restrictions, 300 to 500 ft. system range
 2. Single channel receivers are pre-tuned, users control their own volume.
 3. Easily expanded, no limit to number of users.
 4. Excellent sound quality, inherently free from interference.
 5. Automatic Gain Control for stable listening level.
 6. High performance frequency synthesized, phase-locked-loop tuning.
 7. 8 channels available
 8. Can be powered by a 12 V battery for portable operation.
 9. Choice of balance or unbalanced inputs
 10. Input attenuator and low frequency attenuator control switches.
 11. LED Power and Audio Level Indicators.
 12. RF frequency range that meets ADA conformance guidelines.

PART 2 – PRODUCTS

2.1 All equipment shall be the standard cataloged products of a single manufacturer. The catalog numbers of the following equipment are those manufactured by TELEX, or equal.

2.2 BASE TRANSMITTER (provide 1 for each permanent sound system).

A. Model ST-200 synthesized 16-channel base transmitter, $\frac{1}{4}$ wave antenna, with rack mount kit. Locate adjacent to the sound system equipment and get power from the equipment. Where space is available in the sound equipment rack, install in rack. Co-ordinate with District low voltage consultant and contractor responsible for installation of equipment rack.

B. Antenna: HGA-1 $\frac{1}{2}$ –wave gain antenna for Base Transmitter

2.3 PORTABLE TRANSMITTER

A. PST-16 belt pack transmitter with lapel microphone, adjustable 16 channels, 2 audio inputs.

2.4 RECEIVERS

A. Model SR-50 single fixed channel receivers. Number of receivers required on plan shall be in compliance with ADA public facility guidelines at time of installation. Current ADA guidelines require total number of receivers to be no less than 4% of total seating capacity.

B. Model SR-100 16-channel adjustable frequency receivers.

2.5 EARPHONES

A. DEB-2 dual earbud with cord for normal to moderate hearing loss. (Provide 1 for each receiver).

2.6 BATTERIES

A. Provide with long life alkaline batteries, "Energizer", "Duracell" or equal, for each device requiring batteries such as portable transmitters and receivers.

2.7 WALL PLAQUE

A. Provide sound reinforcement wall plaque per ADA requirements to indicate equipment available for the hearing impaired. Verify location with the architect prior to installation. Submit sample for approval. Use the "international symbol of access for hearing impaired."

PART 3 - EXECUTION

3.1 INSTALLATION

A. The contractor shall supply all equipment, wire, conduit, etc., required for the installation, and needed to provide a complete and usable assistive listening system.

3.2 TESTS AND ADJUSTMENTS

- A. Under completion of the installation of all equipment, and when same is in full operating condition, the Contractor shall perform the initial post completion tests and adjustments as specified hereinafter. Except as otherwise specified, this Contractor shall provide all instruments, equipment, labor and materials necessary to complete the tests.

3.3 WARRANTY

- A. The manufacturer shall guarantee the system and components against defective material and workmanship for a period of one year from the date of final acceptance by the District (owner).

END OF SECTION 27 30 10

SECTION 27 41 00 - AUDIO VISUAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section specifies equipment, materials, installation, configuration and testing requirements for complete and operable Audio-Visual systems. The systems shall comply with the requirements of NFPA codes, California codes, and ADA guidelines. The system(s) shall achieve high quality visual and audio playback with integrated input, output stations with control equipment as required for each space.

1.2 SCOPE

- A. Provide and install all Audio-Visual control equipment, input and output stations, display devices, screens, mounting hardware and accessories as outlined in the design documents.
- B. Labor and Materials: Unless otherwise noted in the Drawings and Specifications, the Contractor shall provide and pay for all labor, materials, equipment, tools, utilities, construction equipment and machinery, transportation and other facilities and services necessary for the proper execution, operation and completion of the Work.
- C. The Contractor shall furnish and install all new conduit/raceway and wire as indicated on the project drawings and/or as required to provide a turn-key system to the customer.
- D. The contractor shall review the proposed final system programming, functionality and expectations with the project manager, Architect, Engineer and District prior to final programming.
- E. After completing of the installation and pretest of the system a satisfactory final test of the entire system shall be made in the presence of the inspector of record (IOR) and District or the District's representative.
- F. The contractor is responsible for Peralta School District/user/operator training.
- G. The contractor shall complete all required project closeout documentation in a timely fashion.
- H. Contractor responsible for coordinating with Facilities IT to match existing systems when applicable.

1.3 RELATED REQUIREMENTS

- A. 01 11 00 - General Requirements
- B. 26 01 10 – General Requirements Electrical
- C. 27 05 00 – Common Work Results for Communications Systems
- D. 27 15 00 - Communications Horizontal Cabling.

1.4 CODES AND STANDARDS

- A. The installed system shall confirm to all California State Codes.

1. 2019 California Building Code (CBC)
 2. 2019 California Electrical Code (CEC)
 3. 2019 California Fire Code (CFC)
 4. 2012 Americans with Disabilities Act (ADA)
- B. National Codes.
1. 2017 NFPA 70 – National Electrical Code
 2. 2016 NFPA 72 – National Fire Alarm Code
 3. 2018 NFPA 101 – Life Safety Code
 4. All Federal codes and Americans with Disabilities Act (ADA)

1.5 UNDERWRITERS LABORATORY (UL) LISTING

- A. All equipment shall be UL listed for its intended purpose.
- B. Any modification that voids the equipment's UL listing is strictly prohibited.

1.6 STATE OF CALIFORNIA LISTING

- A. All equipment shall have California State Fire Marshall listing.

1.7 QUALIFICATIONS

- A. The contractor shall possess a C-7 license.
- B. The A/V contractor shall be an active member of ICIA, NSCA, NAB, BICSI, CTS and/or other similar industry recognized organizations, and provide documentation of same.
- C. The A/V contractor shall be a factory direct dealer for, or establish an equivalent relationship with, the major equipment specified herein, suitable to carry out warranty administration and post warranty repair.
- D. Any new or modified electrical power circuits shall be made by a licensed electrician.
- E. Contractor shall have a minimum of 5 years documented experience and factory authorization to furnish and install the equipment proposed.
- F. Contractor shall be located within 100 miles or less from the project site to support 2-hour response time.

1.8 REFERENCES

- A. Submit the project and customer information of customers for at least three other projects of similar size and complexity using similar technologies.
 1. Shall include a minimum of the following:

- a. Customer Name
- b. Customer Point of Contact
- c. Customer Point of Contact Phone Number and email address
- d. Address of project
- e. Title of Project
- f. Type of project completed

1.9 SYSTEM REQUIREMENTS

- A. System features
 - 1. installations shall seamlessly integrate into the District's existing Audio-Visual systems.

1.10 CONTRACTOR "SHOP DRAWINGS" DESIGN REQUIREMENTS

- A. The Project Shop Drawings represent the level of system design to be provided by the District. Contractor shall provide all additional system design work required, including:
 - 1. Conduit layout and sizing.
 - 2. Wire and cable layout and sizing.
 - 3. Point-to-point wiring and equipment hook-up information.
 - 4. Equipment mounting details.
 - 5. Design of equipment cabinets.
 - 6. Other detailed design work required.
- B. Contractor's design shall conform to all applicable codes and ordinances. All electrical design, including the sizing and placement of conduit, raceways and conductors, shall be in accordance with NFPA 70: National Electrical Code, current version, unless local codes establish more stringent requirements.
- C. Contractor's design work is subject to review and approval by the Architect/Designer/Engineer, Project Manager and/or District personnel.

1.11 SUBMITTALS

- A. Submit product data, shop drawings, manufacturer's installation instructions for this Section in accordance with the Division 01 – General Requirements.

1.12 PRODUCT/SERVICE AVAILABILITY

- A. The manufacturer or their authorized representative shall confirm that within a reasonable distance of the project site there is an established agency which stocks a full complement of products and

offers service during normal business working hours as well as emergency service on all equipment.

1.13 WARRANTY

- A. Refer to Division 01 Warranty section.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All products shall be new and unused and shall be of manufacturer's current and standard production.
- B. Where two or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer
- C. Drawings and Specifications indicate major "diagrammatic" system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. Contractor shall provide all components needed for complete and satisfactory operation.
- D. Product Availability
 - 1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Contract Time.
 - 2. Certain products specified may only be available through factory authorized dealers and distributors. Contractor shall verify his ability to procure the products specified prior to submitting a proposal.
- E. Wire and Cable
 - 1. General: Provide all wire and cable required to install systems as indicated.
 - 2. All cables shall be specifically designed for their intended use (direct burial, aerial, etc.).
 - 3. Wire and cable shall be sized to provide minimum voltage drop and minimum resistance to the devices being supplied.
 - 4. Comply with equipment manufacturers recommendations for wire and cable size and type.
 - 5. Comply with all applicable codes and ordinances.
- F. Conduit and Raceway Systems
 - 1. See Division 27 for conduit and raceway requirements.

2.2 AUDIO VISUAL EQUIPMENT

- A. Refer to Section 270500 part 4 for LUSD requirements for approved parts list and additional

information on system design.

Acceptable Manufacturers:

1. Extron Audio Visual System – No Equal

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

- A. The system shall only be provided by Contractors who are factory authorized to install, service and maintain the system.
- B. The Contractor (or subcontractor listed at time of bid) must have been a factory authorized dealer with the proposed manufacturer for a period of at least two (2) years before the Bid Opening Date.
- C. The Contractor's installers and technicians must also be factory trained and certified to perform such tasks.

3.2 EXAMINATION

- A. The Contractor shall be required to visit the installation site(s) prior to bidding the job. The Contractor acknowledges that the failure to visit the site(s) will not relieve the Contractor of the responsibility for observing and considering those conditions which a Contractor would have observed and considered during a site visit, estimating properly the difficulty and cost of successfully performing the Work or proceeding to perform the Work without additional cost to the District.
- B. The Contractor shall report any discrepancies between the Specifications, Drawings, and Site Examination prior to the Bid Opening Date.

3.3 PREPARATION

- A. The Contractor shall order all required parts and equipment upon notification of award of the Work.
- B. The Contractor shall bench test all equipment prior to delivery to the job site.
- C. The Contractor shall verify the availability of power where required. If a new source of power is required, a licensed electrician shall be used to install it.
- D. <If required> The Contractor shall arrange for obtaining all programming information required including: Network IP address, subnet, gateway, VLAN and associated network requirements as needed for system activation, reporting.

3.4 SHOP DRAWINGS

- A. The Contractor shall create "Shop Drawings" per section 1.09 - CONTRACTOR "SHOP DRAWINGS" DESIGN REQUIREMENTS.
- B. Submit drawings for review and approval by Project Manager.

3.5 INSTALLATION

- A. The Contractor shall coordinate with the District's IT Department if connecting to their network.
- B. Installation shall be in accordance with applicable codes (i.e. NEC, NFPA 72) local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
- C. The installing contractor must coordinate and be aware that LED monitors shall be tethered to wall with adjustable wire cable straps-one each per side of LED monitor. LED monitors shall not be allowed to extend 4" beyond furthest fixed vertical architectural surface per ADA guidelines.
- D. Perform all Work as indicated in the Drawings and Specifications.
- E. All low voltage cables shall be kept away from power circuits.
- F. The Contractor shall also execute adequate testing of the system to insure proper operation.
- G. The Contractor shall provide adequate training of the system users to insure adequate understanding to prevent operating errors.

3.6 WORKMANSHIP

- A. Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform Work with persons experienced and qualified to produce workmanship specified.
- C. Maintain quality control over suppliers and Subcontractors.
- D. Quality of workmanship is considered important. The District's Project Manager will have the authority to reject Work which does not conform to the Drawings and Specifications.

3.7 EQUIPMENT

- A. All equipment shall be bench tested prior to delivery to job site and prior to installation. Bench test per manufacturer's installation instructions.
- B. Deliver, store and handle products under provisions of Division 01

3.8 CABLE

- A. Design, layout, size, and plan new cable runs as required.
- B. Speaker cable shall be minimum 14 AWG, 2 conductor cable.
- C. All cables shall be installed in accordance with Division 27 and code requirements.
- D. All wire and cable passing thru metalwork shall be sleeved by an approved grommet or bushing.
- E. Conduit/raceway fill shall not exceed 40 percent of interior cross-sectional area.
- F. Identify all cables at terminations and at every junction box. Identification shall be made with an approved permanent label, machine generated 3/16" black letters on white tape (Brady or equal.)

- G. Underground cable shall be rated for use.
- H. Neatly dress and tie all cabling.

3.9 FIELD QUALITY CONTROL AND TESTING

- A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
- B. The installation contractor will fine tune and test the systems for optimal performance.
- C. Audio Signal:
 - 1. Signal-to-Noise ratio (including crosstalk): 70 dB minimum.
 - 2. Total Harmonic Distortion: 0.05% maximum from 20 Hz. To 20 kHz.
 - 3. Frequency Response: +/- 0.5 dB, 20 Hz to 20 kHz.
- D. Audio Reproduction:
 - 1. Signal-to-Noise ratio (including crosstalk): 55 dB minimum.
 - 2. Total Harmonic Distortion: 0.05% maximum from 20 Hz. To 20 kHz.
 - 3. Frequency Response:
 - 4. Speech reinforcement loudspeakers, 4" or 6" dia.: +/- 1 dB 100 Hz to 2.5 kHz rolling off at 6 dB/octave from 125 Hz to 80 Hz and at 2 dB/octave above 2.5 kHz as measured on axis of loudspeaker.
 - 5. Speech reinforcement loudspeakers, 8" or 12" dia.: +/- 1.5 dB 125 Hz to 2.5 kHz rolling off at 6 dB/octave from 100 Hz to 63 Hz and at 2 dB/octave above 2.5 kHz as measured on axis of loudspeaker.
 - 6. Program reproduction loudspeakers: +/- 2 dB, 63 Hz to 6kHz decreasing uniformly from a relative level of 0 dB at 6 Hz to a relative level -5 dB at 20 kHz as measured on axis of loudspeaker.
 - 7. Speech Reinforcement Sound Output Capability: Provide program levels of at least 96 dB and speech reinforcement levels of at least 85 dB everywhere in the seating area without objectionable distortion, rattles or buzzes. Use several different samples of recorded music as test signals.
 - 8. Test microphones at each input.
 - 9. Set master output limiting at -6dB with 10:1 ratio.
 - 10. Hum and Noise: Hum and noise shall be inaudible under normal conditions from anywhere in the seating area.
- E. Video Signal:
 - 1. Signal-to-noise ratio (peak to RMS) unweighted DC to 5.5 MHz: 55 dB minimum.

2. Crosstalk unweighted DC to 5.5 MHz: 45 dB minimum.
 3. Line and Field tilt: 2% maximum.
 4. Differential Gain: 3% maximum.
 5. Differential Phase: 2 degree maximum.
 6. Video Timing:
 7. System Timing: Sync coincidence within 50 nanoseconds.
 8. Color Timing: Within 2 degrees at 3.58 MHz
 9. Optical Performance:
 - a. The light fall-off from the center of the projected image to the four corners as measured at the projected image plane, shall not exceed 50%.
 10. The installation contractor will fine tune and test the systems for optimal performance.
- F. Upon reaching substantial completion, perform a complete test and inspection of the system. If found to be installed and operating properly, notify District of your readiness to perform the formal Test & Inspection of the complete system.
- G. Submit the Record Drawings (as-builts) to District for review prior to inspection.
- H. During the formal Test & Inspection (Commissioning) of the system, have personnel available with tools and equipment to inspect wiring, devices and system operation.
- I. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with required codes
- J. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.
- K. If corrections are needed, the Contractor will be provided with a Punch-List of all discrepancies. Perform the needed corrections in a timely fashion.
- L. Notify District when ready to perform a re-inspection of the installation.
- M. The District and the inspector of record (IOR) shall perform all system functions as required by code to ensure proper and complete operation.
- N. When testing has been completed to the satisfaction of both the District and the IOR, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the District.
- O. After the satisfactory completion letter has been received, a continuous and fault free thirty (30) day

“burn-in” period shall begin. Any fault shall reset the “burn-in” period to zero (0). Warranty shall commence at day 31 of a successful and continuous “burn-in” period.

3.10 INITIAL PROGRAMMING AND CONFIGURATION

- A. Contractor shall provide programming and configuration of the Audio-Visual systems for full functionality.
- B. Contractor shall maintain hard copy worksheets which fully document the system program and configuration. Worksheets shall be kept up to date on a daily basis by Contractor until final Acceptance by District. Worksheets shall be subject to inspection and approval by District. Provide final copies to District prior to Project Close-out.
- C. Contractor shall maintain a complete, up-to-date backup of the system configuration. Backup shall be maintained throughout programming period until final Acceptance by District. Submit back-ups to District upon Final Acceptance.

3.11 TRAINING

- A. Contractor shall provide complete system operator and/or user training.
- B. The Contractor shall provide 8 hours of training for all large performance venue installations. Training shall occur over 2-3 days.
- C. The Contractor shall provide 4 hours maximum of training for all classroom and conference room installations. Training shall occur over 1-2 days.
- D. The contractor shall make a video recording of all training sessions and export to digital medium for district archive.
- E. The Contractor shall create quick start guides customized to the specific system being installed at each location. Quick start guides shall be prepared in advance of all training sessions, so they can be distributed and reviewed with staff at time of initial training. All quick start guides shall be laminated.

3.12 AS-BUILT DRAWINGS

- A. A complete set of reproducible “as-builts” drawings in AutoCAD 2010 or newer format (disks) showing the revisions required by the designer’s review and accepted by District. The submitted drawings shall indicate the following:
 - 1. Building floor plan
 - 2. Conduit and wire pathway
 - 3. Type and location of equipment
 - 4. Complete point-to-point wiring between all equipment

3.13 OPERATIONS AND MAINTENANCE MANUAL

- A. In addition to the Division 01 requirements submit an electronic set of documents with bookmarks for:

College of Alameda Transportation Technology
20-175

Issue Date:
Revision Date:

1. System operating instructions
2. System record drawings
3. Spare parts schedule
4. Maintenance schedule
5. Equipment manuals

END OF SECTION

SECTION 27 51 17
PUBLIC ADDRESS SYSTEMS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Coordinate with Peralta School District Facilities to match existing system.

2.2 AMPLIFICATION AND CONTROL EQUIPMENT

2.3 COMPONENTS

- A. Speakers: 8-inch coaxial speaker with integral crossover circuit.
- B. Speaker Baffles and Enclosure: Square, painted steel with uniform perforations.
- C. Horns: Wide dispersion indoor/outdoor horn with driver.
- D. Telephone Interface: 600 ohms - auxiliary input.
- E. Equipment Rack: Floor mounted equipment rack.

2.4 WIRE AND CABLE

- A. Microphone Cord: 20 AWG stranded copper conductor, 600-volt insulation, rated 60 degrees C, two conductor shielded cable with rubber jacket.
- B. Input Cable: 22 AWG copper conductor, 300-volt insulation, rated 60 degrees C, paired conductors twisted together, shielded, and covered with a PVC jacket.
- C. Speaker Wire and Cable: 22 AWG copper conductor, 300-volt insulation, rated 60 degrees C, paired conductors twisted together shielded and covered with a PVC jacket.
- D. Plenum Cable for Speaker Circuits: 22 AWG copper conductor, 300-volt insulation, rated 200

degrees C, paired conductors twisted together shielded and covered with a nonmetallic jacket; suitable for use for Class 2 circuits in air handling ducts, hollow spaces used as ducts, and plenums.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Splice cable only in accessible junction boxes or at terminal block units.
- C. Make cable shields continuous at splices and connect speaker circuit shield to equipment ground only at amplifier.
- D. Install input circuits in separate cables and raceways from output circuits.
- E. Provide protection for exposed cables where subject to damage.
- F. Use armored cable for outside speaker circuits.
- G. Support cables above accessible ceilings to keep them from resting on ceiling tiles. Use spring metal clips or plastic cable ties to support cables from structure for ceiling suspension system. Include bridle rings or drive rings.
- H. Use suitable cable fittings and connectors.
- I. Connect reproducers to amplifier with matching transformers.
- J. Ground and bond equipment and circuits in accordance with Section 260526.

END OF SECTION 27 51 17

SECTION 281300
ACCESS CONTNROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Security access devices.
- B. Access control panel.

1.2 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware.
- B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association 2005 with California Electrical Code 2019 Amendments.

1.4 SYSTEM DESCRIPTION

- A. Security Access System: Control access to building using coded key pads:
 - 1. Selected Exterior Doors: Control access into building.
- B. Coordinate equipment requirements with Peralta School District Facilities to match existing system.

1.5 SUBMITTALS

- A. See Section 013300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Provide system wiring diagram showing each device and wiring connection required.
- C. Product Data: Provide electrical characteristics and connection requirements.
- D. Test Reports: Indicate satisfactory completion of required tests and inspections.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

- F. Project Record Documents: Record actual locations of access authorization equipment.
- G. Operation Data: Operating instructions.
- H. Maintenance Data: Maintenance and repair procedures.
- I. Maintenance Materials: Furnish the following for District (Owner)'s use in maintenance of project.
 - 1. See Section 016600 - Product Requirements, for additional provisions.
 - 2. Deliver keys/cards not used in initial installation to District (Owner) as directed.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Installer Qualifications: Company specializing in installing the products specified in this section with minimum three years documented experience.
- D. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Security Access Control Panel:
- B. Encoded Key Readers:
- C. Encoded Key Controllers:
- D. Encoded Cards:
- E. Key Pad Units:
- F. Electric Strikes:
- G. Electric Locks:
- H. Manual Stations:

I. System Cable:

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use 16 AWG minimum size conductors for detection and signal circuit conductors. Install wiring in conduit.
- C. Make conduit and wiring connections to door hardware devices furnished and installed under Section 087100.

3.2 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 014000.
- B. Manufacturer Services: Furnish services of technician to supervise installation, adjustments, final connections, system testing, and to train District (Owner) personnel.

3.3 CLOSEOUT ACTIVITIES

- A. Demonstrate normal and abnormal modes of operation, and required response to each.
- B. Provide 2 hours minimum of instruction each for two persons.
 - 1. Conduct instruction at project site with manufacturer's representative.

3.4 MAINTENANCE

- A. See Section 017000 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Furnish service and maintenance of security access system for one year from Date of Substantial Completion.

END OF SECTION 281300

SECTION 28 16 00
INTRUSION DETECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Intrusion detection devices.
- B. Alarm control panel.
- C. Signaling devices.

1.2 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware.
- B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).

1.3 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; National Fire Protection Association 2011 with California Electrical Code 2013 Amendments.
- B. NFPA 72 - National Fire Alarm Code and Signaling Code; National Fire Protection Association; 2013.

1.4 SYSTEM DESCRIPTION

- A. Intrusion Detection System: Coordinate with Peralta School District Facilities IT to match existing system.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate system wiring diagram showing each device and wiring connection required.
- C. Product Data: Provide electrical characteristics and connection requirements.
- D. Test Reports: Indicate satisfactory completion of required tests and inspections.

- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F. Project Record Documents: Record actual locations of initiating devices, signaling appliances, and end-of-line devices.
- G. Operation Data: Operating instructions.
- H. Maintenance Data: Maintenance and repair procedures.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.1 ALARM CONTROL PANEL

- A. Control Panel: Modular construction with surface wall-mounted enclosure.
- B. Power supply: Adequate to serve control panel modules, remote detectors, and alarm signaling devices. Include battery-operated emergency power supply with capacity for operating system in standby mode for 24 hours.
- C. System Supervision: Provide electrically-supervised system, with supervised alarm initiating and alarm signaling circuits. Component or power supply failure places system in alarm mode.
- D. Initiating Circuits: Supervised zone module with alarm and trouble indication.
- E. Signal Circuits: Supervised zone coded signal module, sufficient for signal devices connected to system; occurrence of single ground or open condition places circuit in trouble mode and does not disable that circuit from transmitting alarm.
- F. Remote Station Signal Transmitter: Electrically supervised, capable of transmitting alarm and trouble signals over telephone lines to central station receiver.
- G. Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts for each detection zone to

provide accessory functions specified.

- H. Alarm Sequence of Operation: Actuation of intrusion detecting device places system in alarm mode, which causes the following operations:
1. Sound and display local alarm signaling devices with non-coded signal.
 2. Transmit non-coded signal to District selected monitoring central station.
 3. Indicate location of actuated device on control panel and on remote annunciator panel.
 4. Alarm Reset: Key-accessible reset function resets alarm system out of alarm if alarm initiating circuits have cleared.
 5. Lamp Test: Manual lamp test function causes alarm indication at each zone at control panel and at annunciator panel.

2.2 INITIATING DEVICES

- A. Magnetic Switches:
- B. Proximity Switches:
- C. Motion Detectors:
- D. Duress Switches:

2.3 SIGNAL DEVICES

- A. Alarm Bells: NFPA 72, electric vibrating, 8-inch bell with operating mechanism behind dome. Sound Rating: 81 dB at 10 feet.
- B. Remote Annunciator: Provide supervised remote annunciator including audible and visual indication of intrusion by zone, and audible and visual indication of system trouble, in flush wall-mounted enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use 18 AWG minimum size conductors for detection and signal circuit conductors. Install wiring in conduit.
- C. Make conduit and wiring connections to door hardware devices furnished and installed under Section 087100.

3.2 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 014000.

B. Test in accordance with NFPA 72.

3.3 MANUFACTURER SERVICES

A. Provide the services of the manufacturer's technical representative to prepare and start systems.

1. Include services of technician to supervise installation, adjustments, final connections, system testing, and District training.

3.4 CLOSEOUT ACTIVITIES

A. Demonstrate normal and abnormal modes of operation, and required responses to each.

B. Provide 2 hours minimum of instruction each for two persons.

1. Conduct instruction at project site with manufacturer's representative.

3.5 MAINTENANCE

A. See Section 017823 - Execution Requirements, for additional requirements relating to maintenance service.

B. Provide service and maintenance of intrusion detection system for one year from Date of Substantial Completion.

END OF SECTION 28 16 00

SECTION 282300
VIDEO SURVEILLANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cameras.
- B. Control equipment.
- C. Cable and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 281600 - Intrusion Detection.
- B. Section 281300 - Access Control.

1.3 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; National Fire Protection Association 2005 with California Electrical Code 2007 Amendments.

1.4 SYSTEM DESCRIPTION

- A. Description: Provide video communications between points of surveillance indicated on Drawings and central monitoring station. Coordinate all equipment with Peralta School District to match existing system.
- B. Capacity:
 - 1. Cameras: ____.
 - 2. Monitors: ____.
- C. Configuration: NTSC, with 1 volt peak-to-peak across 75 ohms.
- D. Distribution: Baseband, DC to 6 MHz.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate electrical characteristics and connection requirements, including

system wiring diagram.

- C. Product Data: Provide showing electrical characteristics and connection requirements for each component.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Project Record Documents: Record actual locations of cameras and routing of television cable.
- F. Operation Data: Instructions for starting and operating system.
- G. Maintenance Data: Routine trouble shooting procedures.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.
- D. Installer Qualifications: Authorized installer of specified manufacturer with service facilities within 100 miles of Project.
- E. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Cameras: General purpose video camera.
 - 1. Camera Tube: 1/2 inch diameter.
 - 2. Provide phase lock loop to synchronize camera to line voltage zero crossing.
 - 3. Lens: Standard 16 mm lens with no iris.
 - 4. Ratings:
 - a. Input Power: 24 volts, 60Hz.
 - b. Scene Illumination: 0.25 fc for usable picture, 1 fc for full video.
 - c. Resolution: 600 lines, minimum.
 - d. Signal to noise: 44 dB, minimum.

- e. Synchronization: To EIA RS-170, with 2:1 interlace.
 - f. Automatic Light Range: 100,000 to 1.
 - 5. Power Supply: Integral.
 - 6. Housing: Indoor.
- B. Monitors: Rack-mounted monochrome television monitor.
- 1. Screen Size: 21 inches.
 - 2. Ratings:
 - a. Resolution: 800 lines.
 - b. Bandwidth: DC to 6 megahertz.
 - c. Linearity: 2 percent maximum.
- C. Switching Equipment: Sequential switcher with 4 positions and motion detectors for automatic alarm call up.
- 1. Include provisions for loop feed to remote monitor location.
 - 2. Include provisions for rack mounting.
- D. Video Recorders: Video cassette time lapse recorder with adjustable speed ratio from 1:1 to 400:1.
- 1. Format: VHS, 1/2 inch.
 - 2. Provide automatic real time recording on alarm.
 - 3. Include date and time generator.
 - 4. Include provisions for rack mounting.
- E. Equalizing Amplifier:
- 1. Impedance: 75 ohms.
 - 2. Video Gain: 10 dB, maximum.
 - 3. Output: 2 volts peak-to-peak, maximum.

2.2 ACCESSORIES

- A. Main Video Cable: RG 11/F.
- B. Branch Video Cable: RG 59/F.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use branch video cable for circuits less than 500 feet; use main video cable for circuits longer than 500 feet. Provide equalizing amplifier for circuits longer than 100 feet.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Interface installation of video surveillance with security access and intrusion detection systems.

3.3 FIELD QUALITY CONTROL

- A. Provide the services of manufacturer's technical representative to prepare and start systems and supervise final wiring connections and system adjustments.

3.4 ADJUSTING

- A. Adjust manual lens irises to meet lighting conditions.

3.5 CLOSEOUT ACTIVITIES

- A. Demonstrate system operation and provide two hours of instruction with manufacturer's training personnel.
- B. Conduct walking tour of project and briefly describe function, operation, and maintenance of each component.

3.6 MAINTENANCE

- A. See Section 017000 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Provide a separate maintenance contract for specified maintenance service.
- C. Provide service and maintenance of system for one year from Date of Substantial Completion.

END OF SECTION 282300

SECTION 28 31 11

DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this section.
- B. The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:
 - 1. 26.00 Electrical
 - 2. 26.05 Common Work Results for Electrical
 - 3. 21.10 Water-Based Fire-Suppression System
 - 4. 21.22 Clean Agent Fire Extinguishing Systems
 - 5. 23.00 Heating, Ventilating, and Air-Conditioning (HVAC)
 - 6. 25.00 Integrated Automation
- C. The system and all associated operations shall be in accordance with the following:
 - 1. Requirements of the following Model Building Code: California Building Code, 2019 Edition
 - 2. Requirements of the following Model Fire Code: California Fire Code, 2019 Edition
 - 3. Requirements of the following Model Mechanical Code: IMC, 2019 Edition
 - 4. NFPA 72, National Fire Alarm Code, 2016 Edition
 - 5. NFPA 70, National Electrical Code, 2017 Edition
 - 6. NFPA 101, Life Safety Code, 2018 Edition
 - 7. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems, 2018 Edition
 - 8. ANSI/ASME A17.1 / CSA B44, Safety Code for Elevators and Escalators, 2004 Edition
 - 9. ICC/ANSI A117.1 Accessible and Useable Buildings and Facilities, 2017 Edition
 - 10. Local Jurisdictional Adopted Codes and Standards
 - 11. ADA Accessibility Guidelines

1.2 SUMMARY

- A. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.
- B. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.
- C. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:
 - 1. Fire alarm system detection and notification operations.
 - 2. Control and monitoring of elevators, smoke control equipment, door hold-open devices, fire suppression systems, emergency power systems, and other equipment as indicated in the drawings and specifications.
 - 3. One-way supervised automatic voice alarm operations.
- D. Network fire alarm control units shall include all features as described in this specification for stand-alone FACUs and shall have network communication capabilities as described herein.
 - 1. All points monitored and controlled by a single node shall be capable of being programmed as "Public". Each point made public to the network may be programmed to be operated by any other node connected to the network.
 - 2. Network communications shall be capable of supporting "point lists" that can be handled as though they were a single point.

1.3 DEFINITIONS

- A. ADA: Americans with Disabilities Act
- B. AHJ: Authority Having Jurisdiction
- C. ANSI: American National Standards Institute
- D. ASME: American Society of Mechanical Engineers
- E. FACU: Fire Alarm Control Unit
- F. FM: Factory Mutual
- G. IBC: International Building Code
- H. ICC: International Code Council
- I. IDC: Initiating Device Circuit
- J. IEEE: Institute of Electrical and Electronic Engineers
- K. IFC: International Fire Code
- L. IMC: International Mechanical Code
- M. IRI: Industrial Risk Insurers
- N. LED: Light-emitting diode.
- O. NAC: Notification Appliance Circuit

P. NFPA: National Fire Protection Association

Q. NICET: National Institute for Certification in Engineering Technologies.

R. RAC: Releasing Appliance Circuit

S. SLC: Signaling Line Circuit

T. UL: Underwriters Laboratories

U. ULC: Underwriters Laboratories, Canada

1.4 SCOPE OF WORK

A. Provide all new system equipment, material and labor required for the installation of an addressable fire alarm system, complete and fully operational

B. General: Provide a complete, non-coded addressable, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

C. Power Requirements

1. The control unit shall receive AC power via a dedicated fused disconnect circuit.
2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
3. All circuits requiring system-operating power shall be 24 VDC nominal voltage and shall be individually fused at the control unit.
4. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.
5. The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.
6. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control.
7. The system shall support 100% of addressable initiating devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.
8. Loss of primary power shall sound a trouble signal at the FACU. FACU shall indicate when the system is operating on an alternate power supply.

D. Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary.

1. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation.

2. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.
 3. Panels shall be capable of full system operation during new site specific configuration download, master exec downloads, and slave exec downloads.
 4. Panels shall automatically store all program changes to the panel's non-volatile memory each time a new program is downloaded. Panels shall be capable of storing the active site-specific configuration program and no less than 9 previous revisions in reserve. A compare utility program shall also be available to authorized users to compare any two of the saved programs. The compare utility shall provide a deviation report highlighting the changes between the two compared programs.
 5. Panels shall provide electronic file storage with a means to retrieve a record copy of the site-specific software and up to 9 previous revisions. Sufficient file storage shall be provided for other related system documentation such as record drawings, record of completion, owner's manuals, testing and maintenance records, etc.
 6. The media used to store the record copy of site-specific software and other related system documentation shall be electrically supervised. If the media is removed a trouble shall be reported on the fire alarm control unit.
- E. History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.
- F. Recording of Events: The system shall be capable of recording all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout shall differentiate alarm signals from all other printed indications.
- G. Wiring/Signal Transmission:
1. Transmission shall be hard-wired using separate individual circuits for each zone of alarm operation, as required or addressable signal transmission, dedicated to fire alarm service only.
 2. System connections for initiating device circuits shall be Class B, Style D, signaling line circuits shall be Class B, Style 4 and notification appliance circuits shall be Class B, Style Y.
 3. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACU. Provide a distinctive indicating audible tone and alphanumeric annunciation.
 4. Constant Supervision Audio: When provided, audio notification appliance circuits shall be supervised during standby by monitoring for DC continuity to end-of-line resistors.
- H. Required Functions: The following are required system functions and operating features:
1. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-

level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.

2. Noninterfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACU after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.
3. Transmission to an approved Supervising Station: Automatically route alarm, supervisory, and trouble signals to an approved supervising station service provider, under another contract.
4. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACU and the remote annunciator, indicating the type of device, the operational state of the device (i.e. alarm, trouble or supervisory) and shall display the custom label associated with the device.
5. Selective Alarm: A system alarm shall include:
 - a) Indication of alarm condition at the FACU and the annunciator(s).
 - b) Identification of the device /zone that is the source of the alarm at the FACU and the annunciator(s).
 - c) Operation of audible and visible notification appliances until silenced at FACU.
 - d) Unlocking designated doors.
 - e) Shutting down supply and return fans serving zone where alarm is initiated.
 - f) Closing smoke dampers on system serving zone where alarm is initiated.
 - g) Transmission of signal to the supervising station.
6. Supervisory Operations: Upon activation of a supervisory device such as low air pressure switch, and tamper switch, the system shall operate as follows:
 - a) Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.
 - b) Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
 - c) Record the event in the FACU historical log.
 - d) Transmission of supervisory signal to the supervising station.
 - e) Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.
7. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible and visible alarm signals shall cease operation.
8. Priority Two Operations: Upon activation of a priority two condition , the system shall operate as follows:

- a) Activate the system priority two audible signal and illuminate the LED at the control unit and the remote annunciator.
 - b) Pressing the Priority 2 Acknowledge Key will silence the audible signal while maintaining the Priority 2 LED "on" indicating off-normal condition.
 - c) Record the event in the FACU historical log.
 - d) Transmission of priority two signal to the supervising station.
 - e) Restoring the condition shall cause the Priority 2 LED to clear and restore the system to normal.
9. System Reset
- a) The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-arming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
 - b) Should an alarm condition continue, the system will remain in an alarmed state.
10. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.
11. WALKTEST: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:
- a) The city circuit connection and any suppression release circuits shall be bypassed for the testing group.
 - b) Control relay functions associated with one of the 8 testing groups shall be bypassed.
 - c) The control unit shall indicate a trouble condition.
 - d) The alarm activation of any initiating device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.
 - e) The unit shall automatically reset itself after signaling is complete.
 - f) Any opening of an initiating device or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.
 - g) Any device which is activated during the time that Walktest is enabled, but is not within the group under test shall immediately cause a normal alarm sequence to commence as if the system was not under any testing sequence.
12. Install Mode: The system shall provide the capability to group all non-commissioned points and devices into a single "Install Mode" trouble condition

allowing an operator to clearly identify event activations from commissioned points and devices in occupied areas.

- a) It shall be possible to individually remove points from Install Mode as required for phased system commissioning.
- b) It shall be possible to retrieve an Install Mode report listing that includes a list of all points assigned to the Install Mode. Panels not having an install mode shall be reprogrammed to remove any non-commissioned points and devices.

13. Module Distribution:

- a) The fire alarm control unit shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Style 4 (Class B) supervised serial communications channel (SLC):
 - b) Initiating Device Circuits
 - c) Notification Appliance Circuits
 - d) Auxiliary Control Circuits
 - e) Graphic Annunciator LED/Switch Control Modules
 - f) In systems with two or more Annunciators and/or Command Centers, each Annunciator/Command Center shall be programmable to allow multiple Annunciators/Command Centers to have equal operation priority or to allow hierarchal priority control to be assigned to individual Annunciator/Command Center locations.
 - g) Initiating Device Signaling Line Circuits
 - h) Notification Appliance Signaling Line Circuits
 - i) Power Supplies
 - j) Voice System Amplifiers

14. Integrated Automation

15. Building Automation and Control Network (BACnet) Integration

- a) The fire alarm control unit shall be capable of providing a one-way communications interface between the fire alarm control unit and an industry-standard Building Automation and Control Network (BACnet) using ASHRAE® BACnet® IP (internet protocol) compliant with ANSI/ASHRAE Standard 135.
- b) Status of addressable initiating and notification devices shall be accomplished via multi-state BACnet objects, and each point shall include detailed custom descriptions matching those provided in the fire alarm control panel site specific programming.
- c) Programming of the BACnet interface shall be accomplished using the current version of the manufacturer's approved fire alarm panel programming software.
- d) MS/TP Master and MS/TP Slave data link layer options communicating at baud rates up to 76,800 bps shall be supported.

- e) The interface shall be capable of supporting ANSI X3.4, ISO 10656 (ICS-4), ISO 10656 (UCS-2), ISO 8859-1, or IBM/Microsoft DBCS character sets.
- f) A standard RJ-45 Ethernet connection to the Building Automation System Ethernet network shall be provided at the fire alarm control unit as part of the contract.

16. Refer to section: 25.00 Integrated Automation

I. Analog Smoke Sensors:

1. Monitoring: FACU shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
2. Environmental Compensation: The FACU shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
3. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACU.
4. Sensitivity Testing Reports: The FACU shall provide sensor reports that meet NFPA 72 calibrated test method requirements.
 - a) Reports shall be capable of being printed for annual recording and logging of the calibration maintenance schedule.
 - b) Where required, reports shall be accessible remotely through:
 - (a) A Fire Panel Internet Interface using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3. The Fire Panel Internet Interface shall be capable of automatically scheduling email reports to individual user accounts on a weekly, bi-weekly, or monthly schedule
5. The FACU shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACU as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACU and subsequently a system trouble is reported. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.
6. The FACU shall continuously perform an automatic self-test on each sensor that will check sensor electronics and ensure the accuracy of the values being transmitted.

Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.

7. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.
8. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.
9. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.

J. Fire Suppression Monitoring:

1. Water flow: Activation of a water flow switch shall initiate general alarm operations.
2. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.
3. Water flow switch and sprinkler valve tamper switch shall be capable of existing on the same initiating zone. Activation of either device shall distinctly report which device has been activated on the initiating zone.

K. Audible Alarm Notification: By horns in areas as indicated on drawings.

L. Audible Alarm Notification: By voice evacuation and tone signals on loudspeakers in areas as indicated on drawings.

1. Automatic Voice Evacuation Sequence:
 - a) The audio alarm signal shall consist of an alarm tone for a maximum of five seconds followed by an automatic digital voice message. At the end of the voice message, the alarm tone shall resume. This sequence shall sound continuously until the "Alarm Silence" switch is activated.
 - b) All audio operations shall be activated by the system software so that any required future changes can be facilitated by authorized personnel without any component rewiring or hardware additions.

M. Speaker: Speaker notification appliances shall be listed to UL 1480.

1. The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted/shielded wire.
2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
3. The speaker shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for general signaling.

N. Manual Voice Paging

1. The system shall be configured to allow voice paging. Upon activation of any speaker manual control switch, the alarm tone shall be sounded over all speakers in that group.

2. The control unit operator shall be able to make announcements via the push-to-talk paging microphone over the pre-selected speakers.
3. Total building paging shall be accomplished by the means of an "All Call" switch.

O. Constant Supervision of Non-Alarm Audio Functions

1. When required, the system shall be configured to allow Non-Alarm Audio (NAA) functions such as background music or general/public address paging.
2. During NAA operation, the speaker circuit shall be electrically supervised to provide continuous monitoring of the speaker circuit.
3. During an alarm condition, supervision shall be disabled and alarm signals delivered to speakers.

P. Firefighter's Phone: Provide a supervised, two-way communication system between the Command Center/main fire alarm control unit and emergency phones.

1. The firefighter's phone system shall be capable of handling single or simultaneous conversations with all phones connected into the system. As many as six phones shall be able to be connected into the active conversation.
2. The phone system circuits shall be designed to prevent static, hum or other interference for clear, intelligible two-way conversation between all phones of the system.
3. The phone system circuits shall be supervised, such that the FACU shall be able to differentiate between whether a handset has been plugged into the emergency phone jack and whether the circuit has a shorted wire.
4. A beeping busy signal shall indicate to the person attempting to use a remote phone that the signal is being received at the control unit and that the lines are intact.
5. The act of plugging a handset into an emergency phone jack or removal of any phone from its normal hook position shall cause an audible and visual indication at the control unit. Picking up of the master phone and acknowledgment of the phone circuit shall silence the tone and allow for direct two-way communications.
6. The act of unplugging handsets in use and replacement of remote phones to their cradle shall restore normal supervisory functions.
7. Provide emergency phone jacks for installation in each elevator car by the elevator contractor. Required wiring from elevator controls to each elevator car shall be furnished and installed by the elevator contractor.
8. Provide emergency phone jacks as shown on the plans. Each jack shall be mounted on a stainless steel single gang plate with the words "Fire Emergency Phone" screened on each.
9. Provide a minimum of five (3) pluggable emergency phones within a storage cabinet.

Q. Network Communication:

1. A single open, ground or short on the network communication pathway shall not degrade network communications. At the same time the fault condition status of the communication link shall be reported.

2. If a group of nodes becomes isolated from the rest of the network due to multiple fault conditions, that group shall automatically form a sub-network with all common interaction of monitoring and control remaining intact. The network shall be notified with the exact details of the lost communications.
 3. Fiber optics communication shall be provided as an option via a fiber optics media module. All fire alarm network fiber optic communication is to be via full duplex transmission over a single fiber optic cable, either single mode or multi mode.
- R. Addressable Notification Appliances (Applies only where addressable notification is provided):
1. Monitoring: The FACU shall monitor individual addressable notification appliances for status, condition, type of appliance, and configured appliance settings. A fault in any individual appliance shall automatically report a trouble condition on the FACU.
 2. Individual Appliance Custom Label: Each addressable appliance shall have its own 40 character custom label to identify the location of the appliance and to aid in troubleshooting fault conditions.
 3. Individual Appliance Information Display:
 - a) The FACU shall be capable of calling up detailed information for each addressable appliance including the appliance location, status, condition, type of appliance, and configured appliance settings.
 - b) Notification appliances that are not capable of communicating and reporting their individual location, status, condition, type of appliance, and configured appliance settings to the FACU shall not be accepted.
 4. Programmable Appliance Settings:
 - a) The selectable operation of each addressable notification appliance shall be capable of being configured by the FACU without having to replace or remove the appliance from the wall or ceiling.
 - (a) Programmable appliance settings for applicable addressable notification appliances shall include:
 - (1) Operation:
 - ((a)) General Evac
 - ((b)) Alert
 - ((c)) User Defined
 - (2) Style:
 - ((a)) Indoor
 - ((b)) UL Weatherproof
 - ((c)) ULC Weatherproof
 - (3) Candela Selections:
 - ((a)) Indoor: 15, 30, 75, 110, 135, or 185 cd (per UL1971)
 - ((b)) UL Weatherproof: 15 or 75 cd (per UL1971), and 75 or 185 cd (per UL1638)
 - ((c)) ULC Weatherproof: 20, 30 or 75 cd (per ULCS526)
 - (4) Horn Volume:
 - ((a)) Hi
 - ((b)) Low
 - (5) Horn Cadence:

- ((a)) Temporal 3
 - ((b)) Temporal 4
 - ((c)) March Time 20 bpm
 - ((d)) March Time 60 bpm
 - ((e)) March Time 120 bpm
 - ((f)) Steady
 - (6) Horn Tone:
 - ((a)) 520 HZ
 - ((b)) Bell
 - ((c)) Slow Whoop
 - ((d)) Siren
 - ((e)) Hi / Lo
 - b) Systems that require replacement or removal of the appliances from the wall or ceiling to change their applicable operation or settings shall not be accepted.
5. Programmable Notification Zones:
- a) Changing the notification zone assigned to a notification appliance shall be configurable by the FACU and shall not require additional circuits or wiring.
 - b) Systems that require additional circuits and wiring to change the notification zone assigned to a notification appliance shall not be accepted.
6. Other Emergency and Non Emergency Notification:
- a) Where required, notification appliances for purposes not related to fire alarm shall be capable of:
 - (a) being connected to the same circuit as the fire alarm appliances, and
 - (b) being individually configured for their intended use without requiring additional circuits or wiring.
 - b) Systems that require separate circuits and wiring for other Emergency and Non Emergency notification shall not be accepted.
7. Addressable Notification Appliance Automated Self-Test:
- a) The fire alarm control unit shall be capable of performing an automated functional self-test of all self-test notification appliances and meet the requirements in NFPA 72, 14.2.8 Automated Testing and Table 14.4.3.2 testing requirements.
 - b) Test results for each self-test notification appliance shall be stored in non-volatile memory at the fire alarm control unit.
 - c) The fire alarm control unit shall be capable of running a functional automated test for all self-test notification appliances in a general alarm group or for all self-test appliances within a specific notification zone.
 - d) The duration required to complete the automated functional test for all self-test notification appliances shall be accomplished in 2 minutes or less.
 - e) The automated test results for all self-test notification appliances shall be available from the fire alarm control unit within 4 minutes from the start of the test.
 - f) If any notification appliance fails its automated functional self-test an audible and visual trouble signal shall be annunciated at the fire alarm control unit.
 - (a) The self-test trouble signal shall be a latching trouble signal which requires manual restoration to normal.

8. Addressable Notification Appliance Reports:
 - a) The fire alarm control unit shall maintain configuration and test data for each self-test addressable notification appliance.
 - b) The fire alarm control unit shall be capable of generating configuration, self-test, and deficiency reports, that can be viewed through the fire alarm control unit user interface or printed via the fire alarm control unit service port.
 - (a) At minimum, the configuration report shall include the following information applicable for each addressable notification appliance:
 - (1) Point ID
 - (2) Custom Label
 - (3) Device Type
 - (4) Candela Setting
 - (b) At minimum, the self-test report shall include the following information applicable for each self-test notification appliance:
 - (1) Point ID
 - (2) Custom Label
 - (3) Time and Date of last test
 - (4) Pass / Fail results of last visual test
 - (5) Pass / Fail results of last audible test
 - c) The fire alarm control unit shall also be capable of providing a deficiency report that includes a list of all self-test notification appliances that have failed self-test.
9. Magnet test: When the control unit is in diagnostic mode, the appliances shall be capable of being tested with a magnet. The magnet diagnostics shall:
 - a) Pulse the appliance LED to indicate appliance address, and
 - b) briefly sound the individual horn to confirm the audible appliance operation, and
 - c) briefly flash the individual strobe to confirm visible appliance operation
 - d) briefly sound the individual speaker to confirm the audible appliance operation

1.5 SUBMITTALS

A. General: Submit the following according to Conditions of Contract .

1. Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.
2. Wiring diagrams from manufacturer.
3. Shop drawings showing system details including location of FACU, all devices, circuiting and details of graphic annunciator shall be provided to LP Consulting Engineers for review and approval.
4. System power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate in accordance with the prescribed backup time periods and under all voltage conditions per UL and NFPA standards shall be provided to LP Consulting Engineers for review and approval.

5. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, SLC, NAC, relay, sensor, and auxiliary control circuits.
 6. Operating instructions for FACU.
 7. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
 8. Product certification signed by a certified representative of the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.
 9. Record of field tests of system.
- B. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions, if required, to make clarifications or revisions to obtain approval.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A factory authorized installer is to perform the work of this section.
- B. Each and every item of the Fire Alarm System shall be listed under the appropriate category by a Nationally Recognized Testing Laboratory and shall bear the respective "NRTL" label.
- C. The Contractor shall hold a valid California State Contractor's license (C7, C10).
- D. The Contractor shall provide documentations to show the fire alarm contractor have been in the electronics contracting business for a minimum of six years under the same name. He must maintain a full-time sales and service staff at an established business location having the appropriate parts and service facilities. An individual operating out of residential facilities or without the required facilities, staff, or tenure will not be considered as an acceptable contractor for this project.
- E. Contractor shall use NICET Level II Fire Alarm Certified Technicians for field installation.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 1. Notify Architect no fewer than two days in advance of proposed interruption of fire-alarm service.

2. Do not proceed with interruption of fire-alarm service without Architect's written permission.

1.8 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.9 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- C. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.10 MAINTENANCE SERVICE

- A. Warranty Maintenance Service: Provide maintenance of fire alarm systems and equipment for a period of 12 months, using factory-authorized service representatives
- B. Basic Services: Routine maintenance visits on an "as needed" basis at times scheduled with the Owner. Respond to service calls within 24 hours of notification of system trouble either by customer visit or other customer contact as necessary. Adjust and replace defective parts and components with original manufacturer's replacement parts, components, and supplies.
- C. Additional Services: Perform services within the above 12-month period not classified as routine maintenance or as warranty work when authorized in writing. Compensation for additional services must be agreed upon in writing prior to performing services.
- D. Maintenance Service Contract: No later than 60 days prior to the expiration of the warranty maintenance services, deliver to the Owner a proposal to provide contract maintenance and repair services for an additional one-year term. As an option with this proposal, deliver to the Owner a proposal to provide scheduled inspection and testing services for a one-year term. Owner will be under no obligation to accept maintenance service contract proposal or inspection and testing proposal.

1.11 EXTRA MATERIALS

- A. General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:

1. Break Rods for Manual Stations: Furnish quantity equal to 15 percent of the number of manual stations installed; minimum of 6 rods.
2. Notification Appliances: Furnish quantity equal to 10 percent of each type and number of units installed, but not less than one of each type.
3. Smoke Detectors or Sensors, Fire Detectors, and Flame Detectors: Furnish quantity equal to 10 percent of each type and number of units installed but not less than one of each type.
4. Detector or Sensor Bases: Furnish quantity equal to 2 percent of each type and number of units installed but not less than one of each type.
5. Printer Ribbons: Furnish 6 spare printer ribbons when a printer is provided.

PART 2 - PRODUCTS

2.1 ACCEPTABLE EQUIPMENT AND SERVICE PROVIDERS

- A. Manufacturers: The equipment and service described in this specification are those supplied and supported by Johnson Controls and represent the base bid for the equipment.
 1. Subject to compliance with the requirements of this specification, provide products by one of the following:
 - a) Simplex, a Johnson Controls Company
- B. Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.
- C. The equipment and service provider shall be a nationally recognized company specializing in fire alarm and detection systems. This provider shall employ factory trained and NICET Level II certified technicians, and shall maintain a service organization within 50 miles of this project location. The equipment and service provider shall have a minimum of 10 years experience in the fire protective signaling systems industry.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 1. Manual stations.
 2. Heat detectors.
 3. Smoke detectors.
 4. Duct smoke detectors.
 5. Verified automatic alarm operation of smoke detectors.
 6. Automatic sprinkler system water flow.
 7. Fire-extinguishing system operation.
- B. Fire-alarm signal shall initiate the following actions as required:

1. Continuously operate alarm notification appliances.
2. Identify alarm at fire-alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Activate voice/alarm communication system.
6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
7. Close smoke dampers in air ducts of designated air-conditioning duct systems.
8. Activate emergency lighting control.
9. Activate emergency shutoffs for gas and fuel supplies.
10. Record events in the system memory.
11. Record events by the system printer.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. Low-air-pressure switch of a dry-pipe sprinkler system

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at fire-alarm control unit.
4. Ground or a single break in fire-alarm control unit internal circuits.
5. Abnormal AC voltage at fire-alarm control unit.
6. Break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer where provided.

2.3 FIRE ALARM CONTROL UNIT (FACU)

A. The following FACU hardware shall be provided:

1. Power Limited base panel with platinum cabinet and door, 120 VAC input power.
2. 3,000 point capacity where (1) point equals (1) monitor (input) or (1) control (output).
3. 2000 points of annunciation where one (1) point of annunciation equals:

- a) 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
 - b) 1 LED on panel or 1 switch on panel.
4. 9.5 Amp Power Supply minimum with temperature compensated, dual-rate battery charger capable of charging up to 110 Ah batteries without a separate external battery charger. Battery charger voltage and amperage values shall be accessible on the FACU LCD display. Optional cooling fan shall be available to increase base power supply from 9.5 to 12.7 Amps. Optional expansion and back-up power supplies shall be available.
5. One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.
6. One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.
7. Three (3) circuit Class B Addressable Notification Appliance Signaling Line Circuits (SLCs) module.
- a) Each Addressable Notification Appliance SLC shall be rated at 3A and capable of supporting up to 127 Notification Appliances per channel.
 - b) Wiring shall be 18 AWG to 12 AWG unshielded twisted pair wire. Systems that require shielded wire for Notification Appliances shall not be accepted.
 - c) A constant voltage under both primary and secondary power conditions shall be maintained at the notification appliance field wiring terminal connections in the FACU to ensure the voltage drop on the circuit is consistent under both primary and secondary power conditions.
 - d) For systems that do not provide a constant voltage source at the FACU notification appliance field wiring terminal connections, the fire alarm contractor shall:
 - (a) Provide separate point-to-point voltage drop calculations for all notification appliances under worst case secondary power specifications, and
 - (b) Perform a complete functional test of all notification appliances under worst case secondary power conditions.
8. Three (3) circuit Class B Notification Appliance Circuits (NAC; rated 3A@24VDC, resistive) module. The NAC end-of-line resistor value shall be programmable and selected from a wide range of resistance values.
- a) NAC's shall be conventional reverse polarity operation and shall be for synchronized strobes and independent horn/strobe operation over two wires.
 - b) NACs shall be selectable as auxiliary power outputs derated to 2 A for continuous duty.
 - c) Strobe synchronization and audible cadence synchronization shall be across all panel NAC circuits. Systems that cannot provide listed synchronization across all panel NAC's shall not be acceptable.
9. Where required provide Intelligent Remote Battery Charger for charging up to 50Ah batteries.
10. Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory or other fire

response functions. Relays shall be capable of switching up to ½ A @ 120VAC, inductive.

11. The FACU shall support up to (5) RS-232-C ports and one service port. All (5) RS-232 Ports shall be capable of two-way communications.
 12. Remote Unit Interface: supervised Class B (Style 4) or Class X (Style 7) serial communication channel for control and monitoring of remotely located annunciators and I/O panels.
 13. Programmable DACT for either Common Event Reporting or per Point Reporting.
 14. Modular Network Communications Card.
- B. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures.
- C. Alphanumeric Display and System Controls: Panel shall include an 80 character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.
1. The system shall have the capability to provide expanded content, multi-line, operator interface displays as indicated on the drawings and specifications. The expanded content multi-line displays shall be Quarter-VGA (QVGA) or larger and be capable of supporting a minimum of 854 standard ASCII characters to minimize or eliminate the levels of navigation required for access to information when responding to critical emergencies and abnormal system conditions. The QVGA operator interface shall provide operator prompts and six context sensitive soft-keys for intuitive operation.
 - a) Expanded content, multi-line operator interfaces shall be capable of providing the following functions:
 - (a) Dual language operation with Instant-Switch language selection during runtime.
 - (b) Activity display choices for:
 - (1) First 8 Events.
 - (2) First 5 Events and Most Recent Event (with first and most recent event time and date stamps).
 - (3) First Event and Most Recent Event (with first and most recent event time and date stamps).
 - (4) Scrollable List Display displays a scrollable list of active points for the event category (alarm, priority 2, supervisory, or trouble) selected. The position in this list will be the last acknowledged point (not flashing) at the top followed by the next 7 unacknowledged points (flashing).
 - (5) General Event Status (alarm, priority 2, supervisory, or trouble in system)
 - (6) Site Plan
 - (c) Equal or hierarchal priority assignment. In systems with two or more operator interfaces, each operator interface shall be programmable to allow multiple operator interfaces to have equal operation priority or to allow hierarchal priority control to be assigned to individual operator

- interfaces (locations).
 - (d) Up to 50 custom point detail messages for providing additional point specific information in detailed point status screens.
 - (e) Bitmap file import for operator interface display of site plan and background watermark images.
 - b) Expanded content, multi-line displays shall have the capability to provide Dual-Language operations indicated on the drawings and specifications.
 - (a) Language selection shall be via a switch on the operator interface panel. Operator interface panels shall support instant-language-switchover during runtime to allow the operator to toggle between languages each time the language selection switch is operated, without requiring complicated multi-step processes.
 - (b) Both one-byte and two-byte characters shall be supported.
- D. Distributed Module Operation: FACU shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Style 4 (Class B) supervised serial communications channel (SLC):
1. Addressable Signaling Line Circuits
 2. Initiating Device Circuits
 3. Notification Appliance Circuits
 4. Auxiliary Control Circuits
 5. Graphic Annunciator LED/Switch Control Modules
 - a) In systems with two or more Annunciators and/or Command Centers, each Annunciator/Command Center shall be programmable to allow multiple Annunciators/Command Centers to have equal operation priority or to allow hierarchal priority control to be assigned to individual Annunciator/Command Center locations.
 6. Amplifiers, voice and telephone control circuits
- E. Voice Alarm: Provide an emergency communication system, integral with the FACU, including voice alarm system components, microphones, amplifiers, and tone generators. Features include:
1. Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface. Each amplifier shall be capable of performing constant supervision for non-alarm audio functions such as background music and general paging.
 2. Dual alarm channels permit simultaneous transmission of different announcements to different zones or floors automatically or by use of the central control microphone. All announcements are made over dedicated, supervised communication lines. All risers shall support Class B wiring for each audio channel.
 3. Emergency voice communication audio controller module shall provide up to 32 minutes of message memory for digitally stored messages. Provide supervised

connections for master microphone and up to 5 remote microphones. Optional Microphone Multiplex modules shall support a total of 40 remote microphones.

4. Status annunciator indicating the status of the various voice alarm speaker zones and the status of fire fighter telephone two-way communication zones.
5. When required, Redundant Voice Command Centers shall be capable of generating voice paging from more than one node in a network audio system.

F. Evacuation System - Non-Alarm Audio

1. The fire alarm control unit shall provide non-alarm audio from an owner supplied paging and/or music source over the fire alarm evacuation speakers. This feature shall be an integral part of the fire alarm system, and shall use some or all of the audio components from the fire alarm evacuation system.
2. The fire alarm system and the non-alarm audio operation shall comply with NFPA 72 requirements for non-emergency purposes at a fire command center that is not constantly attended by a trained operator.
3. All fire alarm system hardware and software shall be U.L. listed for non-alarm audio use. The fire alarm system shall supervise for system hardware and field wiring faults while playing non-alarm audio over the evacuation speakers. Any hardware failure or speaker circuit fault detected when the system is playing non-alarm audio shall report a trouble on the fire alarm control unit. All audio components used for both the non-alarm audio and the fire alarm evacuation system shall be manufactured by the same supplier.
4. The non-alarm audio shall have two dedicated audio inputs to the fire alarm control unit. Terminal strip connections and an industry standard RCA receptacle shall be provided at the fire alarm control unit for terminating the owner's audio source. The fire alarm input shall be 600-Ohm impedance. The inputs on the fire alarm control unit shall be electrically isolated via an isolation transformer.
5. The fire alarm control unit shall accept industry standard "line level audio input" from the owner's non-alarm audio source. The fire alarm system hardware and software shall distribute the audio over the fire alarm evacuation speakers. The selection of which speaker zones to distribute the non-alarm audio to the building occupants shall be coordinated with the owner's representative.
6. The fire alarm control unit shall be able to make audio input level adjustments from the owner's non-alarm audio source. This adjustment will match the non-alarm audio source to the fire alarm input. After the audio levels are adjusted, the owner shall control the volume level from the non-alarm audio source.
7. The fire alarm system will have the capability to provide operator "keys" that will adjust the volume level of pre-assigned non-alarm audio zones. The volume level of non-alarm audio that is being broadcast to any audio zone will also be individually adjustable by time of day via a pre-specified schedule.
8. The non-alarm audio shall be the lowest priority audio on the fire alarm system. The non-alarm audio shall not interfere with any of the fire alarm emergency signals that may include live voice, pre-recorded emergency voice messages, or any alert tones. Switches shall be located on the fire alarm control unit to turn on or off the non-alarm audio system feature. The fire alarm control unit shall have LED lamps

to indicate the ON vs. OFF status of the non-alarm audio feature. Speaker circuits that are actively broadcasting non-alarm audio will also be indicated by LEDs.

9. The non-alarm audio shall be synchronized throughout the fire alarm life safety system amplifiers and speaker circuits. Any remote amplifier panels located on the fire alarm system network shall also be synchronized. The system shall be capable of accepting a system-wide non-alarm audio input at the main fire alarm control or another local non-alarm audio input at a remote amplifier panel to serve only the areas served by that remote panel.
10. Multiple non-alarm audio sources must be accessible by the fire alarm non-alarm audio system. Each separate non-alarm audio source will have the ability to be broadcast into a distinct fire zone, depending on occupant preference. Any system restricted to a limited number of non-audio sources will not be accepted. The system must have the capability of broadcasting an unlimited number of non-alarm sources, except as determined by the number of individual fire zones served by the fire alarm system.
11. Non-alarm audio shall be automatically turned off in the event of primary power failure to the fire alarm control unit or any of the remote amplifier panels controlled by the main fire alarm control unit.

G. Fire fighters' telephone communication system: Arrange system to use dedicated, two-way, supervised voice communication links between the FACU and remote fire fighters' telephone stations throughout the building.

2.4 ADDRESSABLE INITIATING

A. ADDRESSABLE MANUAL PULL STATIONS

1. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
2. Description: Addressable double- action type, red LEXAN. Station shall mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units. Station shall be pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit. Where double-action stations are provided, the mechanism shall require two actions push top activation door to initiate an alarm.
3. Provide with a front showing red LED showing that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the station LED shall be on steady.
4. Indoor Protective Shield: Where required, or as indicated on the drawings, provide a factory-fabricated, tamperproof, clear LEXAN enclosure shield and red frame that easily fits over manual pull stations which shall be hinged at the top to permit lifting for access to initiate a local alarm. Unit shall be NRTL listed. Lifting the cover shall actuate an integral battery-powered audible horn intended to discourage false-alarm operation. The horn shall be silenced by lowering and realigning the

shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.

5. California Building Code, Title 24: Where required pull station shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. Provides a more easily operated pull station lever compared to standard stations.
6. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

B. ADDRESSABLE ANALOG SMOKE SENSORS

1. General Requirements for System Smoke Detectors:
 - a) Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:
 - b) Factory Nameplate: Serial number and type identification.
 - c) Operating Voltage: 24 VDC, nominal and shall be two-wire type.
 - d) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
 - e) Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. Provide terminals in the fixed base for connection to building wiring. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit. Sensors shall include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACU. Sensor address shall be located in base to eliminate false addressing when replacing sensors. Integral Addressable Module shall be arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit. Each sensor base shall contain an integral visual-indicating LED that will flash to provide power-on status each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor LED shall be on steady. Sensor and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base.
 - f) Each sensor base shall contain a magnetically actuated test switch to provide for easy pre-certification alarm testing at the sensor location.
 - g) Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the

default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.

- h) Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit. Provide multiple levels of detection sensitivity for each sensor.
- i) Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACU.
- j) The sensor's electronics shall be immune from nuisance alarms caused by EMI and RFI. Removal of the sensor head for cleaning shall not require the setting of addresses.
- k) Bases: CO Sensor, relay output, sounder and isolator bases shall be supported alternatives to the standard base.

2. Addressable Sensor Bases

- a) Standard base - Twist lock addressable base with address selection DIP switch accessible from front with sensor removed. Integral red LED for power-on (pulsing), or alarm or trouble (steady on). Locking anti-tamper design mounts on standard outlet box.
- b) Sensor Base with remote device connection - All standard base features with wired connection for either a Remote LED alarm indicator or remote relay (relay is unsupervised and requires separate 24VDC)
- c) Supervised Relay Bases - All standard base features and shall be available in either a 4-Wire Sensor Base to use with remote or locally mounted relay; requires separate 24 VDC, or as a 2-Wire Sensor Base to use with remote or locally mounted relay; no separate power required. Supervised relay operation shall be programmable and shall be manually operated from control panel.
- d) Sensor base with built-in electronic alarm sounder - All standard base features and piezoelectric sounder shall provide high output (88 dBA) with low current requirements (20 mA). Sounder shall be synchronized via SLC communications or by the NAC if NAC powered, sounder shall operation shall be programmable and shall be manually operated from control panel.
- e) 520 Hz Sensor base with built-in electronic low frequency sounder - All standard base features and piezoelectric sounder shall provide a low frequency 520 Hz Square Wave (85 dBA) with nominal current requirements (115 mA). Sounder shall be synchronized via SLC communications or by the NAC if NAC powered, sounder operation shall be programmable and shall be manually operated from control panel.
 - (a) Emitted tone shall be a 520Hz Square Wave signal in compliance with the requirements of the 2010 edition of NFPA 72 for sleeping areas.
 - (b) The 520Hz Sounder base shall be listed to UL 268 and UL464, Audible Signal Appliances.

C. ADDRESSABLE DUCT SMOKE SENSOR

- 1. Standard Addressable Duct Smoke Sensor Unit. Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the

specific duct size and installation conditions where applied. Duct housing shall include relay or relay driver as required for fan shutdown.

- a) Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACU.
 - b) The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output shall be fully programmable independent of the sensor head for activation by other alarm initiating devices within the fire alarm system. Relay shall be mounted within 3 feet of HVAC control circuit.
 - c) Duct Housing shall provide a magnetic test area and Red sensor status LED and Duct Housing shall provide a relay control Yellow LED trouble indicator.
 - d) Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
 - e) Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.
 - f) For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.
 - g) Each duct smoke sensor shall be provided with a Remote Test Station with an alarm LED and test switch.
 - h) Where indicated provide a NEMA 4X weatherproof duct housing enclosure that shall provide for the circulation of conditioned air around the internally mounted addressable duct sensor housing to maintain the sensor housing at its rated temperature range. The housing shall be UL Listed to Standard 268A.
2. Addressable In-Duct Mounted Smoke Sensors. Photoelectric type, for applications with controlled dust and humidity providing HVAC duct smoke sensing where sampling tube designs are not appropriate. In-Duct housing shall include relay or relay driver as required for fan shutdown.
- a) Shall accommodate duct airflow from 0 to 4000 ft/min (0 to 1220 m/min), and provide environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct smoke sensor by the FACU.
 - b) The In-Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output shall be fully programmable independent of the sensor head for activation by other alarm initiating devices within the fire alarm system. Relay shall be mounted within 3 feet of HVAC control circuit.
 - c) Standard models shall be for rectangular ducts from 6" (152 mm) square to 36" (914 mm) square with optional adapters available to allow use with round ducts of 6", 8" (203 mm), 10" (254 mm) or 12" (305 mm) in diameter.
 - d) In-Duct Housing shall provide a magnetic test area and Red sensor status LED and In-Duct Housing shall provide a relay control Yellow LED trouble indicator.

- e) Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
 - f) Each duct smoke sensor shall be provided with a Remote Test Station with an alarm LED and test switch.
3. Addressable Air Aspirating Duct Smoke Sensors. Photoelectric type smoke detection with an aspirating system shall provide remote sensor location for ducts with difficult service access. Detectors shall support remote housing up to 82ft with 1.05" OD rigid pipe; detectors shall support remote housing up to 50ft with 3/4" OD flexible tubing. Sampling tubes shall be provided per design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Duct Detection system shall be UL listed to Standards 268A, and ULC listed to Standard S529.
- a) Environmental compensation, programmable sensitivity settings, status testing and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACU.
 - b) The Air Aspirating duct detection system shall supervise air flow through the duct housing and shall communicate trouble to the fire alarm control unit on a high or low air flow condition.
 - c) The Air Aspirating Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single Form C contact rated at 7A@28VDC and 120VAC. This auxiliary relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.
 - d) Air Aspirating Duct Housing shall provide a magnetic test area and Red sensor status LED.
 - e) Each duct smoke sensor shall have a Remote Test Station with an alarm LED and test switch.
 - f) Each duct housing shall have remote functional smoke testing capability.
 - g) Each duct housing shall be supplied with a replacement air inlet filter.
 - h) Each duct housing shall have an optional water trap with a ball valve for draining to eliminate moisture buildup.
 - i) The Air Aspirating Detection system shall have an operating air velocity range of 0 to 4000 linear ft/minute) 0 to 1220 meters/minute.
 - j) The Addressable Air Aspirating Detection system shall be capable of use in other areas as open area detection where point type detectors are not practical, such as; prison cells in correctional facilities, transformer vaults, cable tunnels and MRI rooms.

D. ADDRESSABLE HEAT SENSORS

1. General Requirements for Heat Detectors: Comply with UL 521.
2. Thermal Sensor Combination type: Fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; Actuated by either a selected fixed temperature or a rate of rise that exceeds a preset amount per minute unless otherwise indicated.
3. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by

thermal lag. Selectable rate compensated, fixed temperature sensing with or without rate-of-rise operation.

4. Mounting: Twist-lock base interchangeable with smoke-sensor heads.
5. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
6. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and programmable to operate at 135-deg F, 155-deg F or 190-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACU for either 15-deg F or 20-deg F per minute.
7. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.
8. Unless otherwise indicated, sensors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for temperature by fire-alarm control unit.
 - a) Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
 - b) Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135-deg F, 155-deg F or 190-deg F. (57, 68 or 88 deg C.).

E. ADDRESSABLE CO SENSOR

1. Addressable CO Sensor
 - a) The CO Sensor shall be an addressable carbon monoxide (CO) sensing module providing both CO toxic gas detection and enhanced fire detection, and shall be listed to UL 268, Smoke Detectors for Fire Alarm Signaling Systems and UL 2075, Gas and Vapor Detectors and Sensors; allowing systems to be listed to UL 2034, Single and Multiple Station Carbon Monoxide Alarms.
 - b) The CO Sensor shall include CO sensor element mounted in the sensor base which can be easily replaced without replacing the complete sensor base assembly.
 - c) The CO Sensor base shall provide address selection in the base allowing the address to remain with its location when the sensor is removed for service or type change.
 - d) The CO Sensor base shall include an integral red LED to indicate the power-on, trouble, test mode or alarm status.
 - e) CO sensor shall provide enhanced fire detection with the addition of two selectable modes of operation: Nuisance Alarm Reduction Mode and Faster Fire Detection.
 - f) The CO Sensor shall provide a 10 year life expectancy before replacement is necessary or required.
 - g) The CO Sensor base shall report the following CO Sensor troubles: Communication loss, Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life), and Sensor Missing/Failed.
2. Addressable CO Sensor Sounder Base
 - a) The CO Sensing element shall support operation with a Sounder base; the CO Sensor Sounder base shall provide temporal code 3 (TC3) for fire, or

- temporal code 4 (TC4) for toxic carbon monoxide alarms.
 - b) The CO Sensor Sounder base shall be listed to UL464, Audible Signal Appliances.
 - c) CO sensor shall provide enhanced fire detection with the addition of two selectable modes of operation: Nuisance Alarm Reduction Mode and Faster Fire Detection.
 - d) The CO Sensor Sounder Base shall include CO sensor element mounted in the sounder base which can be easily replaced without replacing the complete sensor base assembly.
 - e) The CO Sensor Sounder base shall provide address selection in the base allowing the address to remain with its location when the sensor is removed for service or type change.
 - f) The CO Sensor Sounder Sensor base shall include an integral red LED to indicate the power-on, trouble, test mode or alarm status.
 - g) The CO Sensor Sounder base shall report the following CO Sensor troubles: Communication loss, Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life), and Sensor Missing/Failed.
 - h) The CO Sensor Sounder Base shall be interchangeable with the CO Sensor 520 Hz Sounder Base.
3. Addressable CO Sensor 520 Hz Sounder Base
- a) The CO Sensing element shall support operation with a 520 Hz Sounder base; the 520 Hz CO Sounder base shall provide temporal code 3 (TC3) for fire, or temporal code 4 (TC4) for toxic carbon monoxide alarms.
 - b) Emitted tone shall be a 520Hz Square Wave signal in compliance with the requirements of the 2010 edition of NFPA 72 for sleeping areas.
 - c) The CO Sensor 520Hz Sounder base shall be listed to UL 268 and UL464, Audible Signal Appliances.
 - d) CO sensor shall provide enhanced fire detection with the addition of two selectable modes of operation: Nuisance Alarm Reduction Mode and Faster Fire Detection.
 - e) The CO Sensor 520 Hz Sounder Base shall include CO sensor element mounted in the sounder base which can be easily replaced without replacing the complete sensor base assembly.
 - f) The CO Sensor 520 Hz Sounder base shall provide address selection in the base allowing the address to remain with its location when the sensor is removed for service or type change.
 - g) The CO Sensor 520 Hz Sounder base shall include an integral red LED to indicate the power-on, trouble, test mode or alarm status.
 - h) The CO Sensor 520 Hz Sounder base shall report the following CO Sensor troubles: Communication loss, Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life), and Sensor Missing/Failed.
 - i) The CO Sensor 520 Hz Sounder Base shall be interchangeable with the standard CO Sensor Sounder Base.

F. ADDRESSABLE MULTI-POINT/MULTI-SENSOR/MULTI-CRITERIA SENSOR

- 1. Smoke and heat sensing shall be available to be combined in a single housing to provide smoke activity accurately monitored by photoelectric sensing technology and thermal activity accurately monitored by thermistor sensing technology.

2. A correlation algorithm of smoke activity and thermal activity shall be provided for intelligent fire detection earlier than with either technology activity alone but shall provide software and programming capabilities to help reduce nuisance alarms.
3. Individual sensor information shall be processed by the host fire alarm control unit to determine sensor status and to determine whether conditions are normal, off-normal, or alarm.
4. Analog information from each sensor type shall be digitally communicated to the control panel where it is to be analyzed. Photoelectric sensor input is to be stored and tracked as an average value with an alarm or abnormal condition being determined by comparing the sensor's present value against its average value. Thermal data is to be processed to look for absolute or rate-of-rise temperature as desired.
5. Monitoring each photoelectric sensor's average value shall provide a software filtering process that compensates for environmental factors (dust, dirt, etc.) and component aging, which shall provide an accurate reference for evaluating new activity. The intent of this process is to be a significant reduction in the probability of false or nuisance alarms caused by shifts in sensitivity, either up or down. Status indications of dirty and excessively dirty shall be automatically generated allowing maintenance to be performed on a per device basis.
6. Peak activity per sensor shall be stored by the host fire alarm control unit to assist in evaluating specific locations where the alarm set point for each sensor shall be capable of being determined at the control panel, and selectable as more or less sensitive as the individual application requires.
7. Alarm set points shall be programmed for timed automatic sensitivity selection (such as more sensitive at night, less sensitive during day). Control panel programming shall also provide multi-stage operation per sensor, for example a 0.2% level may cause a warning to prompt investigation while a 2.5% level may initiate an alarm.
8. Combination smoke and heat sensors Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute. The fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
9. Bases: CO Sensor, relay output, sounder, 520 Hz Sounder, and isolator bases shall be supported alternatives to the standard base.

G. ADDRESSABLE CIRCUIT INTERFACE MODULES

1. Addressable Circuit Interface Modules: Arrange to monitor or control one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of waterflow, valve tamper, non-addressable devices, and for control of AHU systems.
2. Addressable Circuit Interface Modules will be capable of mounting in a standard electric outlet box or be cabinet mounted using appropriate mounting to allow quick replacement. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line

circuit or a separate two wire pair running from an appropriate power supply, as required.

3. There shall be the following types of modules:
 - a) Type 1: Monitor Circuit Interface Module:
 - (a) For conventional 2-wire smoke detector and/or contact device monitoring with Class B or Class A wiring supervision. This module will communicate status (normal, alarm, trouble) to the FACU.
 - (b) For conventional 4-wire smoke detector with Class B wiring supervision. The module will provide detector reset capability and over-current power protection for the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACU.
 - b) Type 2: Line Powered Monitor Circuit Interface Module
 - (a) This type of module is an individually addressable module that has both its power and its communications supplied by the two wire signaling line circuit. It provides location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall have the capability of communicating four zone status conditions (normal, alarm, current limited, trouble) to the FACU.
 - (b) This module shall provide location specific addressability for up to five initiating devices by monitoring normally closed or normally open dry contact security devices. The module shall communicate four zone status conditions (open, normal, abnormal, and short). The two-wire signaling line circuit shall supply power and communications to the module.
 - c) Type 3: Single Address Multi-Point Interface Modules
 - (a) This multipoint module shall provide location specific addressability for four initiating circuits and control two output relays from a single address. Inputs shall provide supervised monitoring of normally open, dry contacts and be capable of communicating four zone status conditions (normal, open, current limited, and short). The input circuits and output relay operation shall be controlled independently and disabled separately.
 - (b) This dual point module shall provide a supervised multi-state input and a relay output, using a single address. The input shall provide supervised monitoring of two normally open, dry contacts with a single point and be capable of communicating four zone status conditions (normal, open, current limited, and short). The two-wire signaling line circuit shall supply power and communications to the module.
 - (c) This dual point module shall monitor an unsupervised normally open, dry contact with one point and control an output relay with the other point, using a single address. The two-wire signaling line circuit shall supply power and communications to the module.
 - d) Type 4: Line Powered Control Circuit Interface Module
 - (a) This module shall provide control and status tracking of a Form "C" contact. The two-wire signaling line circuit shall supply power and communications to the module.
 - e) Type 5: 4-20 mA Analog Monitor Circuit Interface Module
 - (a) This module shall communicate the status of a compatible 4-20 mA sensor to the FACU. The FACU shall annunciate up to three threshold

levels, each with custom action message; display and archive actual sensor analog levels; and permit sensor calibration date recording.

4. All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the module is powered and communicating with the FACU. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

2.5 CONVENTIONAL INITIATING

A. CONVENTIONAL MANUAL PULL STATIONS

1. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
2. Description: Conventional double- action type, red LEXAN. Station shall mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units. Station shall be pull-lever type; with integral terminal strip to accommodate wiring connections to fire-alarm control unit Initiating Device Circuit. Where double-action stations are provided, the mechanism shall require two actions push top activation door to initiate an alarm.
3. Indoor Protective Shield: Where required, or as indicated on the drawings, provide a factory-fabricated, tamperproof, clear LEXAN enclosure shield and red frame that easily fits over manual pull stations which shall be hinged at the top to permit lifting for access to initiate a local alarm. Unit shall be NRTL listed. Lifting the cover shall actuate an integral battery-powered audible horn intended to discourage false-alarm operation. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.
4. California Building Code, Title 24: Where required pull station shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. Provides a more easily operated pull station lever compared to standard stations.
5. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.6 ADDRESSABLE NOTIFICATION

A. ADDRESSABLE ALARM NOTIFICATION APPLIANCES

1. Addressable Notification Appliances: The Contractor shall furnish and install Addressable Notification Appliances and accessories to operate on compatible signaling line circuits (SLC).
 - a) Addressable Notification appliance operation shall provide power, supervision and separate control of horns and strobes over a single pair of wires. The

- controlling channel (SLC) digitally communicates with each appliance and receives a response to verify the appliance's presence on the channel. The channel provides a digital command to control appliance operation. SLC channel wiring shall be unshielded twisted pair (UTP), with a capacitance rating of less than 60pf/ft and a minimum 3 twists (turns) per foot.
- b) All Notification Appliances shall operate as a completely independent device allowing for specific location alerting of both fire alarm and Mass Notification functions. Each visible device (both clear fire alarm and amber mass notification) shall be capable of operating on multiple notification zones or completely separate from all other notification devices, this allows "On the fly" program operation changes for Mass Notification alerting and fire alarm notification.
 - c) All Notification Appliances shall operate as a completely independent device allowing for appliances in handicap accessible rooms and other locations to operate on the same SLC and to activate individually based on an alarm condition in a room or as part of a general alarm condition where all appliances activate together.
 - d) Individual Notification Appliances shall be able to be grouped into zones (or operational groups) by central programming at the main fire alarm control unit.
 - e) Notification Appliances shall provide for "unobtrusive" testing. Each Notification Appliance shall be tested for audible and visible operation on an individual basis at the device or from the main fire alarm control unit, allowing for minimal invasive impact.
 - f) Class B (Style 4) notification appliances shall be wired without requiring traditional in/out wiring methods; addressable "T" Tapping shall be permitted. Up to 127 addresses can be supported on a single channel.
 - g) Each Addressable notification appliance shall contain an electronic module and a selectable address setting to allow it to occupy a unique location on the channel. This on-board module shall also allow the channel to perform appliance diagnostics that assist with installation and subsequent test operations. A visible LED on each appliance shall provide verification of communications and shall flash with the appliances address setting when locally requested using a magnetic test tool.
 - h) Each addressable notification appliance shall have electrical test point access without removing the device cover.
 - i) Both wall mount and ceiling mount devices shall be available along with weatherproof devices.
2. Addressable Horn: Addressable horn shall be listed to UL 464. Horn shall support Temporal Code 3, March Time (20, 60, or 120 BPM), Continuous, and Temporal Code 4 coding patterns. Horn appliances shall have a High/Low Setting, programmable by channel from the addressable controller or by appliance from the host FACU. The horn shall have a minimum sound pressure level of 83 or 89 dBA for steady) or of 79 or 85 dBA for coded operation. The horn device shall consist of three pieces; appliance, cover and mounting plate. For ease of installation the mounting plate shall mount directly to a standard single gang, double gang or 4" square electrical box, without the use of special adapter or trim rings. When the appliance is connected to an active circuit, the front cover of the appliance shall be removable without causing a trouble indication on the fire alarm control unit.

Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot.

3. Addressable Visible/Only: Addressable strobe shall be listed to UL 1971. The V/O device shall consist of a xenon flash tube and associated lens/reflector system, cover and mounting plate. For ease of installation the mounting plate shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. When the appliance is connected to an active circuit, the front cover of the appliance shall be removable without causing a trouble indication on the fire alarm control unit. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. The V/O appliance shall be provided with multiple minimum flash intensities of 15cd, 30cd, 75cd, 110cd, 135cd and 185cd. The Candela levels shall be settable from the fire alarm control unit or by using a hardware selector on the appliance.
4. Addressable Audible/Visible: Addressable combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. The strobe device shall consist of a xenon flash tube and associated lens/reflector system, cover and mounting plate. For ease of installation audible/visible mounting plate shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. The strobe shall provide multiple minimum flash intensities of 15cd, 30cd, 75cd, 110cd, 135cd and 185cd. The Candela levels shall be settable from the fire alarm control unit or using a hardware selector on the appliance. The Horn shall support Temporal Code 3, March Time (20, 60, or 120 BPM), Continuous, and Temporal Code 4 coding patterns. The horn shall have a minimum sound pressure level of 83 or 89 dBA for steady or 79 or 85 dBA for coded operation. When the appliance is connected to an active circuit, the front cover of the appliance shall be removable without causing a trouble indication on the fire alarm control unit. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. The appliance shall be capable of two-wire synchronization with one of the following options:
 - a) Synchronized Strobe with Horn on steady.
 - b) Synchronized Strobe with Temporal Code Pattern on Horn.
 - c) Synchronized Strobe with March Time cadence on Horn.
 - d) Synchronized Strobe firing to NAC sync signal with Horn silenced.
5. Addressable Weatherproof Visible Only: Addressable weatherproof strobe shall be UL 1971 listed for indoor applications with strobe intensity selectable as 15 or 75 cd or UL 1638 listed for outdoor applications with strobe rated at 75 cd (WP75) or 185 cd (WP185). The appliances shall be acceptable for indoor and outdoor, extended temperature and extended humidity applications. The V/O device shall consist of a xenon flash tube and associated lens/reflector system, weatherproof cover and weatherproof mounting box. The V/O appliance shall be provided with multiple minimum flash intensities of 15, 75, WP 75, or WP 185 candela. The Candela levels shall be settable from the fire alarm control unit or by using a hardware selector on the appliance.
6. Addressable Weatherproof Audible/Visible: Addressable weatherproof horn/strobe shall be UL 464 and UL 1971 listed for indoor applications with strobe intensity selectable as 15 or 75 cd or UL 1638 listed for outdoor applications with strobe rated at 75 cd (WP75) or 185 cd (WP185).. The appliances shall be acceptable for

indoor and outdoor, extended temperature and extended humidity applications. The A/V device shall consist of a xenon flash tube and associated lens/reflector system, weatherproof cover and weatherproof mounting box. The strobe appliance shall be provided with multiple minimum flash intensities of 15, 75, WP 75, or WP 185 candela. The Candela levels shall be settable from the fire alarm control unit or by using a hardware selector on the appliance. The Horn shall support Temporal Code 3, March Time (20, 60, or 120 BPM), Continuous, and Temporal Code 4 coding patterns. The horn shall have a minimum sound pressure level of 81 or 87 dBA for steady or 80 or 87 dBA for coded operation.

7. Standard Speaker: Speaker notification appliances shall be listed to UL 1480.
 - a) The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted / shielded wire.
 - b) The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
 - c) The speaker shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for general signaling.
 - d) The speaker shall install directly to a 4" square, 1 ½" deep electrical box with 1 ½" extension.

8. Addressable Speaker: Addressable Speaker notification appliances shall be listed to UL 1480. Individual device level supervision and activation control shall be provided by the fire alarm control unit.
 - a) Speakers shall be individually powered, addressed, and controlled from a compatible fire alarm control unit Signaling Line Circuit (SLC) using Unshielded Twisted Pair (UTP) cable and T-taps shall be allowed for Class B installation reducing wiring costs and wiring distances. Shielded cable shall not be required.
 - b) Speakers shall provide for Fire Alarm and General Signaling functionality in a single unit, eliminating additional devices. Device "Self-Test" shall be supported by a compatible fire alarm control unit and shall be UL listed and NFPA 72 compliant. Speakers shall be UL listed to provide a 520Hz audio tone in compliance with NFPA 72 for sleeping areas.
 - c) The speaker audio shall be provided by a standard 25VRMS or 70.7VRMS audio circuit using Unshielded Twisted Pair (UTP) cable and T-taps shall be allowed for Class B installation reducing wiring costs and wiring distances. Supervision of this circuit shall be provided by the addressable speaker. Shielded cable shall not be required.
 - d) Speaker power taps shall be at a minimum of 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker shall have a minimum UL rated sound pressure level of 86dBA at 10 feet for the Standard Output version and 84dBA at 10 feet for the High Fidelity version.
 - e) Speakers shall be available in either "Standard Output" with a minimum frequency response of 400 to 4000 Hz or in "High Fidelity Output" with a minimum frequency response of 200 to 10,000 Hz. Standard Output speakers shall use a multi-tapped speaker for audio/tone notification.
 - f) Wall mount appliances shall be available in White and Red and ceiling mount appliances shall be available in White, Red, and Black. Labeling shall be available as either "FIRE", "ALERT" or no labeling.

- g) The speaker shall install directly to a 4" square, 2 1/8" deep electrical box. Extensions for these boxes shall not be required. Units shall be modular in design to allow for easy installation and for easy changing of device color and labeling.

- 9. Isolator Module: Isolator module provides short circuit isolation for addressable notification appliance SLC wiring. Isolator shall be listed to UL 864. The Isolator shall mount directly to a minimum 2 1/8" deep, standard 4" square electrical box, without the use of special adapter or trim rings. Power and communications shall be supplied by the Addressable Controller channel SLC; dual port design shall accept communications and power from either port and shall automatically isolate one port from the other when a short circuit occurs. The following functionality shall be included in the Isolator module:
 - a) Report faults to the host FACU.
 - b) On-board Yellow LED provides module status.
 - c) After the wiring fault is repaired, the Isolator modules shall test the lines and automatically restore the connection.

- 10. Accessories: The contractor shall furnish the necessary accessories.

B. ADRESSABLE APPLIANCE SLC REPEATER

- 1. Addressable Repeater shall supervise channel (SLC) wiring and communicate with and control addressable notification appliances. The Repeater shall be a stand-alone panel capable of powering one (1) NAC SLC. The channel (SLC) shall be rated for 3 amps and support up to 127 addresses. Power and communication for the notification appliances shall be provided on the same pair of wires. It shall be possible to program the High/Low setting of the audible (horn) appliances by channel from the addressable controller.
 - a) The Repeater shall provide a constant voltage output to ensure NAC current and voltage do not vary whether the panel is operating on AC or battery. The output voltage during alarm conditions shall be 29 VRMS.
 - b) Addressable SLC notification appliance circuits shall be Class B, Style 4.
 - c) For Class B circuits, the Repeater shall support up to 4 Class B branches directly at its output terminals for one SLC.
 - d) The internal power supply and battery charger shall be capable of charging up two 12.7 Ah batteries internally mounted or 25Ah batteries mounted in an external cabinet.
 - e) The Repeater panel can be mounted close to the host fire alarm control unit or remotely.
 - f) The Repeater status shall be communicated to the host fire alarm control unit and locally indicated.
 - g) A 200mA auxiliary output shall be available
 - h) The Repeater shall be listed to UL 864

2.7 FIRE FIGHTERS' TELEPHONES

- A. Telephone Hand Sets: High-impact plastic handset, heavy-duty coil cord, and hook switch; connected to the FACU by means of dedicated, supervised communication lines. Handsets have a dynamic receiver and a carbon transmitter, operating on 24VDC.

2.8 REMOTE LCD ANNUNCIATOR

- A. Provide a remote LCD Annunciator, where required, with the same "look and feel" as the FACU operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys; Status LEDs and LCD Display as the FACU.
- B. Annunciator shall have super-twist LCD display with two lines of 40 characters each. Annunciator shall be provided with four (4) programmable control switches and associated LEDs.
- C. Under normal conditions the LCD shall display a "SYSTEM IS NORMAL" message and the current time and date.
- D. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.
- E. The LCD shall display the following information relative to the abnormal condition of a point in the system:
 - 1. 40 character custom location label.
 - 2. Type of device (e.g., smoke, pull station, waterflow).
 - 3. Point status (e.g., alarm, trouble).
- F. Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACU.

2.9 DACT/IP/CELLULAR COMMUNICATOR TRANSMITTER

- A. DACT/IP/Cellular communicator transmitter shall be listed to UL 864 for Central Station Service and be acceptable for use by the remote or central station.
- B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for, or connected via TCP/IP or Cellular to a remote or central station. When contact is made with the remote or central station, signals shall be transmitted. If connecting by POTS and service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the remote or central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal. If service is by TCP/IP or Cellular and connection is lost, transmitter shall initiate the local trouble signal and a loss of connection shall be indicated at the central station.
- C. Local functions of the DACT/IP/Cellular communicator transmitter shall include the following:
 - 1. Configurable with a primary and secondary path.
 - 2. Paths can use any of the external connections, telephone line, cellular, or LAN Ethernet connections.

3. 3G with 2G fall back cellular connection through the cellular module. Antenna extension kits for areas of poor connectivity.
4. Communications failure with the remote or central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address or loss of power.
4. Low battery.
5. Abnormal test signal.
6. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Constant connection supervision and detects failures within 90 seconds for IP/Cellular connection.

2.10 RADIO ALARM TRANSMITTER

A. Transmitter shall comply with NFPA 1221 and shall be listed and labeled by an NRTL.

B. Comply with 47 CFR 90.

C. Description: Manufacturer's standard commercial product; factory assembled, wired, tested, and ready for installation and operation.

1. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper-resistant flush tumbler lock.
2. Signal Transmission Mode and Frequency: VHF or UHF 2-W power output, coordinated with operating characteristics of the established remote alarm receiving station designated by Owner.
3. Normal Power Input: 120-V ac.
4. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.
5. Antenna: Omnidirectional, coaxial half-wave, dipole type with driving point impedance matched to transmitter and antenna cable output impedance. Wind-load strength of antenna and mounting hardware and supports shall withstand 100 mph (160 km/h) with a gust factor of 1.3 without failure.
6. Antenna Cable: Coaxial cable with impedance matched to the transmitter output impedance.
7. Antenna-Cable Connectors: Weatherproof.
8. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.

- D. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. Transmitted messages shall correspond to standard designations for fire-reporting system to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:
1. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.
 2. System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.
 3. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.
 4. Local Fire-Alarm-System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.
 5. Local Fire-Alarm-System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.
 6. Local Fire-Alarm-System Supervisory-Alarm Message: Actuated when the building alarm system indicates a supervisory alarm.

2.11 NETWORK SYSTEM INTEGRATOR

- A. The Network System Integrator shall provide Agency Listed integration capable of communicating the status information from multiple brands and/or vintages of control units onto the fire alarm network for reporting at a central command center location and at other network nodes (panels).
1. Protocol communication interfaces for systems integration that require ongoing protocol development necessary to maintain compatibility and agency listings with new versions of software releases shall not be substituted.
- B. The Network System Integrator shall receive primary and secondary power from a 120VAC/240VAC source and cabinet contained standby batteries.
- C. The Network System Integrator shall provide 8 I/O points expandable to 32, each programmable as a monitor input or relay output for status communication onto the network
1. Inputs shall be rated to monitor dry contacts on the host control panel
 2. Dry contact relay outputs from the Network System Integrator shall be available to provide status conditions from this unit or other network nodes to the local building control panel
- D. The Network System Integrator shall provide the following additional features:
1. 6 Amp power supply for auxiliary power with integral battery charger for secondary power requirements

2. Intuitive user interface behind locked solid door to provide for unit status reporting, testing, diagnostics, and historical log access
 3. Dual language selection, including unicode character languages
 4. User interface is to be a 4.3" or greater diagonal color touchscreen LCD with separate status LED's
- E. The Network System Integrator shall be capable of maintaining Fire Alarm Network communications with other network nodes (panels) when the monitored interface panel is powered down for service

2.12 EMERGENCY POWER SUPPLY

- A. General: Components include battery, charger, and an automatic transfer switch.
- B. Battery: Sealed lead-acid or nickel cadmium type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm notification devices in alarm mode for a period of 15 minutes.

2.13 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 1. Factory fabricated and furnished by manufacturer of device.
 2. Finish: Paint of color to match the protected device.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.
- B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:
 1. Factory trained and certified personnel.
 2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
 3. Personnel licensed or certified by state or local authority.

3.2 EQUIPMENT INSTALLATION

- A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, Ethernet drops, and all other necessary material for a complete operating system.

- B. Existing Fire Alarm Equipment shall be maintained fully operational until the new equipment has been tested and accepted.
- C. Equipment Removal: After acceptance of the new fire alarm system, disconnect and remove the existing fire alarm equipment and restore damaged surfaces. Package operational fire alarm and detection equipment that has been removed and deliver to the Owner. Remove from the site and legally dispose of the remainder of the existing material.
- D. Water-Flow and Valve Supervisory Switches: Connect for each sprinkler valve required to be supervised.
- E. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.
- F. Install manual station with operating handle 48 inches (1.22 m) above floor. Install wall mounted audible and visual notification appliances not less than 80 inches (2.03 m) above floor to bottom of lens and not greater than 96 inches (2.44 m) above floor to bottom of lens.
- G. Mount outlet box for electric door holder to withstand 80 pounds pulling force.
- H. Make conduit and wiring connections to door release devices, sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control units, duct smoke detectors .
- I. Automatic Detector Installation: Conform to NFPA 72.
- J. Ethernet Drop: A standard RJ-45 Ethernet connection to the owner's Ethernet network shall be provided at each fire alarm control unit as part of the contract.

3.3 PREPARATION

- A. Coordinate work of this Section with other affected work and construction schedule.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Alarm-initiating connection to smoke-control system (smoke management) at firefighter smoke-control system panel.
 - 2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
 - 3. Smoke dampers in air ducts of designated air-conditioning duct systems.
 - 4. Alarm-initiating connection to elevator recall system and components.

5. Alarm-initiating connection to activate emergency lighting control.
6. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
7. Supervisory connections at valve supervisory switches.
8. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
9. Supervisory connections at elevator shunt trip breaker.
10. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
11. Supervisory connections at fire-pump engine control panel.

3.5 WIRING INSTALLATION

- A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).
- B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.
- C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.
- D.
- E. Ethernet Circuits:
 1. Ethernet circuits shall be provided to the Fire Alarm Control Unit as shown on the plans.
 2. Where a dedicated Fire Alarm Ethernet LAN is specified only Agency Listed Fire Alarm Ethernet hardware shall be installed.
 3. The electrical contractor shall coordinate and ensure proper Ethernet connections occur at the fire alarm control unit prior to system turnover.

3.6 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.7 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.
- B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:
 - 1. Factory trained and certified.
 - 2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
 - 3. International Municipal Signal Association (IMSA) fire alarm certified.
 - 4. Certified by a state or local authority.
 - 5. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.
- C. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
- D. Inspection:
 - 1. Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
 - 2. Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.
- E. Acceptance Operational Tests:
 - 1. Perform operational system tests to verify conformance with specifications:
 - a) Each alarm initiating device installed shall be operationally tested. Each device shall be tested for alarm and trouble conditions. Contractor shall submit a written certification that the Fire Alarm System installation is complete including all punch-list items. Test battery operated emergency power supply. Test emergency power supply to minimum durations specified. Test Supervising Station Signal Transmitter. Coordinate testing with Supervising Station monitoring firm/entity.
 - b) Test each Notification Appliance installed for proper operation. Submit written report indicating sound pressure levels at specified distances.
 - c) Test Fire Alarm Control Unit and Remote Annunciator.
 - 2. Provide minimum 10 days notice of acceptance test performance schedule to Owner, and local Authority Having Jurisdiction.

- F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
- G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Use NFPA 72 Forms for documentation.
- H. Final Test, Record of Completion, and Certificate of Occupancy:
 - 1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Provide completed NFPA 72 Record of Completion form to Owner and AHJ.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

3.10 CLEANING AND ADJUSTING

- A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.
- B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound pressure levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.11 TRAINING

- A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.
 - 1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 8 hours' training.
 - 2. Schedule training with the Owner at least seven days in advance.

END OF SECTION 283111

SECTION 31 10 00
SITE CLEARING

PART 1- GENERAL

1.1 DESCRIPTION

- A. Furnish labor, material and equipment required for the removal of surface debris, removal of trees, shrubs and other plant life, where indicated on the Drawings; remove temporary structures, miscellaneous debris in and around structures to be demolished; remove appurtenances and abandoned utilities; remove brush, trash, salvage and debris resulting from clearing; remove paved asphalt concrete areas. Include stripping and stockpiling of topsoil, and dust control.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Perform Work, including disposal of debris, in accordance with rules and regulations of State and local agencies having jurisdiction. Comply with Section 02 41 00.

1.3 SUBMITTALS

- A. Conform to the requirements of Section 00 72 13 for submittal procedures.
- B. Product Data: Provide data for Products specified.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 SURROUNDING SITE CONDITION SURVEY

- A. Prior to commencing the Work, Contractor, and District's Representative shall tour the Project site together to examine and record damage to existing adjacent buildings, streets, sidewalks, and all other improvements. This record shall serve as a basis for determination of subsequent damage due to Contractor's operations and shall be signed by all parties making the tour. Any cracks, sags, or damage to the adjacent buildings and improvements not noted in the original survey, but subsequently discovered, shall be reported to the District's Representative.

1.5 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Drawings show existing above and below grade structures, drainage lines, storm drains, sewers, water, gas, electrical, hot water, steam, condensate and other utilities that are known to the District in their approximate location. The Contractor shall exercise care in avoiding damage to these facilities. The Contractor will be held responsible for the repair if damaged. The District or District's Representative does not guarantee that all utilities or obstructions are shown or that the locations indicated are accurate.

- B. Locate and surface mark (various colors specified by USA) all known existing underground structures and utilities before proceeding with construction operations that may damage them. Stake and flag utility valve boxes and other surface structures. Prior to commencing excavation and trenching, coordinate with Underground Service Alert (USA North/1-800-227-2600 or 811) for field verification and marking of utilities within limits of Project site. Provide USA notification permit number to District's Representative prior to starting site Work. Existing underground structures and utilities shall be kept in service unless approval to interrupt or shutdown service is obtained from District's Representative. If damaged, the utility shall be repaired with no adjustment of Contract Sum or Contract Time.
- C. Contractor shall uncover, prior to any earthwork for new construction, all existing piping where crossings, interferences, close proximity (5 feet or less) or connections are shown on the Drawings, from 1 foot below proposed construction limit to the existing ground surface. Any variation in the actual elevations and the indicated elevations shall be brought to the District's Representative's attention. If the Contractor does not expose all existing utilities, Contractor shall not be entitled to additional compensation for Work necessary to avoid interferences.
- D. If interferences occur at locations other than the general locations shown on the Drawings, and such utilities are damaged before their locations have been established, or create an interference, the Contractor shall notify the District's Representative and a method for repairing the damage or correcting the interference shall be supplied by the District's Representative. Payment for additional Work due to interferences not shown on the Drawings shall be in accordance with the General Conditions.
- E. Care shall be exercised to prevent damage to adjacent facilities including walks, streets, curbs, and gutters from settlement, lateral movement, undermining, and washout and other hazards; where equipment will pass over these obstructions suitable planking shall be placed. Damaged facilities, due to the Contractor operations, shall be removed and replaced at the Contractor's expense.
- F. If any other structures or utilities are encountered, request District's Representative to provide direction on how to proceed with the Work.
- G. If any structure or utility is damaged, take immediate action to ensure the safety of persons and property. Correct damage immediately. Contractor shall bear all costs of correction, replacement, repair, restoration, including related damages additional testing, inspection, and compensation for District's Representatives services and expenses. Compensation to the District shall be made by deductive Change Order.
- H. No Work is to be performed on energized electrical equipment unless scheduled with the District's Representative. The District reserves the right to specify specific conditions for all Work involving energized high-voltage electrical equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Herbicide: Surflan, Chipco, Ronstar G, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: Verify existing conditions at the site and include all work evident by site inspection whether or not shown on the Drawings.

3.2 PREPARATION AND COORDINATION

- A. Notify District's Representative before starting Work and comply with District requirements.
- B. Do not close or obstruct roadways, sidewalks or hydrants without District's Representative's approval.
- C. Tree Protection: Trees identified by the District's Representative for relocation shall be removed and turned over to the District, at a location identified by the District's Representative.

3.3 SITE CLEARING

- A. Conduct clearing with minimum interference to public and private access. Maintain egress and access from adjacent structures at all times.
- B. Clear the site within the limits shown and remove all pavement, trees, shrubs, remaining brush, stumps and waste material that would interfere with construction operation, except as specifically indicated otherwise on the Drawings, or identified by the District's Representative.
- C. Apply an approved herbicide to remaining roots over 1 1/2 inches in diameter.
- D. In areas not to be further excavated, fill depressions resulting from site clearing. Place and compact satisfactory soil materials in accordance with the Geotechnical Report.
- E. Clear undergrowth and deadwood without disturbing subsoil.
- F. Pollution and Dust:
 - 1. Conduct operations so as to prevent windblown dust and dirt from interfering with adjacent property's normal operations.
 - 2. Wet down dirt areas by spraying as required to prevent dust from becoming airborne.
- G. Assume liability for all claims related to windblown dust and dirt.
- H. No burning on District property.

3.4 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with the applicable provisions of Section 00 72 13 and 02 41 00, including, but not limited to:
 - 1. Separate packaging materials by type and place in locations designated by the Contractor.
 - 2. Place unused scrap material in locations designated by the Contractor.

END OF SECTION

SECTION 31 20 00
EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rough Grading of site, Excavating, backfilling, compaction and grading, as required to obtain contours and elevations indicated on the Drawings.
 - 2. Subgrade preparation for buildings, exterior concrete slabs and pavement areas.
 - 3. Handling of soils identified to contain naturally occurring asbestos (NOA).
- B. Related Sections:
 - 1. Section 01 25 13 Product Options and Substitutions
 - 2. Section 02 41 00 Site Demolition.
 - 3. Section 31 23 33 Trenching and Backfilling.

1.2 REFERENCES

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 1997.
- B. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2000a.
- C. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.
- D. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2000.
- E. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 1994.
- F. ASTM D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregates; 1995.
- G. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 1996.
- H. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 1996.
- I. Project Geotechnical Report, prepared by Terraphase Engineering, Inc., dated August 20, 2020, Terraphase Project Number 0034.008.0001.

1.3 DEFINITIONS

- A. Excavation: Earth excavation includes excavation of pavement and other obstructions visible on the ground surface; underground structures, utilities and other items to be demolished and

removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

- B. Subgrade: Previously undisturbed material prepared, and compacted to required density and elevation to support a structure, or pavement system.
- C. Subbase: Compacted layer of approved material used between the subgrade and the pavement.
- D. Earth Excavation: Materials not otherwise defined as rock excavation including removal and disposal of pavements, visible on grade obstructions, underground structures, utilities and other items indicated to be removed.
- E. Unauthorized Excavation: Includes removal and disposal of material beyond subgrade elevations, and dimensions indicated without prior approval of the College's Representative.
- F. Standard Specifications: Refers to the Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation (Caltrans), latest edition. In case of conflict between the Standard Specifications and these Specifications, the strictest Specifications shall govern.
- G. Provisions for measurement and payment specified within the Standard Specifications shall be disregarded and the provisions of this Agreement shall govern.
- H. Relative Compaction: Ratio, expressed as a percentage of field dry density as compacted to a maximum dry density of representative sample of the same material determined by ASTM D1557.

1.4 SUBMITTALS

- A. Conform to the requirements of Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data on Products specified.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- F. Deliver samples of import backfill materials to College's Representative in quantities sufficient for testing. Deliver at least 15 days prior to use.
- G. Submit a Confined Space Emergency Plan in accordance with Section 01 41 00 Regulatory Requirements prior to any personnel entering trenches or excavations greater than 5 feet in depth.

1.5 QUALITY ASSURANCE

- A. Testing and Inspection Service: College will engage soil testing and inspection service, for quality assurance testing during earthwork operations.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Stockpile satisfactory excavated materials in approved location, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
 - 1. Do not store soil within drip line of trees indicated to remain.

1.7 PROJECT CONDITIONS

- A. Subsurface Conditions: Contractor responsibility to determine the exact nature and extent of subgrade conditions.
 - 1. Subgrade and geotechnical information provided by the College shall not relieve the Contractor of responsibility for being familiar with the character and extent of subsurface conditions that may be encountered during performance of the Work.
- B. Do not use explosives.
- C. The Contractor shall assess and evaluate all site conditions and layout the work before any earthwork shall begin.

1.8 MAINTENANCE

- A. Repair settlement at excavated areas for a period of one year following final acceptance at no additional cost to College. Remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment; restore appearance, quality, and condition of surface and finish to match adjacent work, and eliminate evidence of restoration.

1.9 WARRANTY

- A. The Contractor shall warrant the Work against settlement for a period of one year after the date of final acceptance, and shall repair damage caused by settlement within that time. For the purpose of this Specification, settlement will be deemed to have occurred if on paved surfaces, depressions greater than 3/8 inch occur relative to paved surfaces outside the excavation area.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill Materials: If imported fill is necessary it should meet the requirements of this section.
 - 1. Imported fill should be clean and sourced from a non-industrial facility not located adjacent to a busy street. The geotechnical engineer must approve all imported fill.
 - 2. All materials to be used as general engineered fill, including onsite soil, should be free of organic material, contain no rocks or lumps larger than 4 inches in greatest dimension, be non-corrosive, have low to moderate expansive potential (Plasticity Index less than 20), and contain at least 10% fines.
 - 3. Any proposed underground utilities should be installed on properly placed (jetting for compaction is prohibited) bedding materials. Pipe bedding should extend to a depth in accordance with the manufacturer's specification. The bedding should extend to at least one pipe diameter, minimum of 4 inches, over the top of the pipeline. The bedding material may consist of compacted free-draining sand, gravel, or crushed rock.
 - a. Pipe bedding material should have a Sand Equivalent (SE) of at least 30.
 - 4. Controlled density fill shall be composed of cementitious materials, aggregate, water, and an air-entraining admixture, as follows:
 - a. Cementitious materials shall be Portland cement in combination with fly ash.
 - b. Admixture shall be an air-entraining agent.

- c. Aggregate Content: CDF mixture shall contain no aggregate larger than 3/8 inch. Amount passing a No. 200 sieve shall not exceed 12%. No plastic fines shall be present.
 - d. Air Content: Total calculated air content of the sample, prepared in accordance with ASTM C231, shall not exceed 30%.
 - e. Strength: Controlled density fill shall have an unconfined compressive strength at 28 days from 50 psi to a maximum of 150 psi.
- B. Crushed Rock Capillary Break: Compacted, free-draining crushed rock at least 4 inches thick, graded so that 100 percent passes the 1-inch sieve and less than 5 percent passes the No. 4 sieve.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Excavate by hand within drip-line of trees to remain. Do not damage trees or roots, prevent dehydration of exposed roots.
- B. Surfaces to receive fill and soils to be compacted shall be free of standing water, and shall not be saturated with water.
- C. In asphalt concrete paved areas, neatly saw cut pavement 12 inches beyond the limits of excavations. If edge of pavement is located within 30 inches of limit of excavation, remove pavement to existing edge.
- D. Remove existing utility lines that traverse the site as indicated on Drawings.

3.2 SITE CLEARING

- A. Complete clearing and stripping as indicated on Drawings. Existing surface vegetation, root zones, organic materials, over-sized materials (greater than 3 inches in maximum dimension) and all debris shall be removed from development areas and disposed of outside the construction limits.
- B. It is possible abandoned utility lines, septic tanks, cesspools, wells and/or foundations may exist on site. If encountered within the area of construction, these items shall be removed and disposed of off-site. Abandon existing wells in accordance with applicable regulatory requirements. Existing utility pipelines that extend beyond the limits of the proposed construction and that are to be abandoned in-place shall be plugged with cement grout to prevent migration of soil and/or water. All excavations resulting from removal activities shall be cleaned of loose or disturbed material, including all previously-placed backfill, and dish-shaped to permit access for compaction equipment.

3.3 SITE PREPARATION AND GRADING

- A. The Site should be cleared and grubbed to remove surficial organic materials. Clearing is to include the removal of accumulated surface debris and vegetation, if any. Soil containing more than 2% organic material should be segregated for use as the topsoil in any landscaped areas, with the approval of the project owner. Soils containing more than 2% organic materials should not be used for engineered fill.
- B. Tree root balls should be entirely excavated. Site utilities that are to be abandoned should be excavated and removed from the Site. Excavations from the removal of trees and utilities

should be backfilled as discussed in Section 3.5. The existing fill can then be placed across the site in loose lifts no thicker than 9 inches and be compacted to 90% of its maximum dry density, at a moisture content at least 3% wet of the soil's optimum water content, as determined using the methodology of ASTM D 1557.

- C. All imported fill is also to be compacted in 9-inch loose lifts to a minimum of 90% of the soil's maximum dry density as determined using the methodology of ASTM D 1557.
- D. Any Bay Mud excavated during site preparation should be removed from the Site.

3.4 CONTROL OF WATER AND DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding the site and surrounding area. Provide dewatering equipment necessary to drain and keep excavations and site free from water.
- B. Dewater during backfilling operation so that groundwater is maintained at least one foot below level of compaction effort.
- C. Protect subgrades from softening, undermining, washout and damage by rain or water accumulation.
- D. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations.
- E. Maintain dewatering system in place until dewatering is no longer required.

3.5 EXCAVATION AND OVEREXCAVATION

- A. Overexcavate the existing soils beneath proposed building pads to a depth of 2-feet below finished grades and recompact as engineered fill. The overexcavation limits shall extend a minimum of 5-feet laterally in all directions from the building footprint. When excavation has reached required subgrade elevation, notify College Representative who will inspect conditions. When unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and place excavated material as directed by College Representative. After overexcavation and prior to placement of engineered fill, processing of the exposed subgrades shall be performed by scarifying the subgrade to a depth of at least 8-inches, uniformly moisture conditioning or drying-back the soil to 2-percent above the optimum moisture content, and compacting to a minimum of 90-percent relative compaction.
- B. Excavation for Pavements: Cut surface under pavements to comply with pavement section shown on Contract Documents.
- C. Coordinate excavation, preparation and backfill with Work of related Sections for Project Site utilities, drainage and irrigation systems.
- D. Perform footing excavations after fill placement is complete.

3.6 EXCAVATION AND BACKFILLING

- A. Trenches should be excavated as required by the plans and specifications, using appropriate equipment. Where necessary, trenches should be sloped or shored by the contractor, in accordance with the governing safety standards to provide a safe work site. The contractor shall be responsible for any temporary slopes and trenches excavated at the Site and for design of shoring, should it be required.

- B. Trenches and other excavations located adjacent to existing foundations should be located such that an imaginary line drawn at a 45-degree angle from the bottom of the outer edge of the spread footing does not intersect the trench.
 - 1. Trenches and other excavations that will pass close to a future spread footing or slab-on-grade foundation, within an imaginary line drawn at 45 degrees down from the bottom of the future footing or slab, should be backfilled with clean fill compacted to at least 95% relative compaction or with flowable fill prior to constructing the foundation or slab.
- C. Trenches should be backfilled with compacted fill, in accordance with the stricter of the recommendations contained in this section or in accordance with local requirements. Fill material should be placed in lifts no greater than 8 inches in loose thickness and compacted by mechanical means. Trench backfill should be compacted to at least 90% relative compaction, except where located within a pavement section where the upper 18 inches of the trench backfill below subgrade level will require compaction to at least 95%.

3.7 BACKFILL AND COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification as indicated below.
- B. Moisture condition to a minimum of 1 percent above the optimum moisture content and replace the excavated material or any approved supplementary import material in lifts not to exceed 8 inches in loose thickness and compact each lift to a minimum 90 percent relative compaction. Depending on the type of compaction equipment selected by the Contractor, thinner lifts may be necessary to achieve the required degree of compaction. Additional fill lifts shall not be placed if the previous lift did not meet the minimum required relative compaction or if soils conditions are not firm and stable. Disking and/or blending may be required to uniformly moisture-condition soils used for engineered fill. Acceptance of compacted material is based on the material being properly mixed, moisture conditioned, compacted and stable under construction equipment. If any of these criteria are not met, the material may not be accepted.
- C. Percentage of Maximum Density Requirements: Compact soil to no less than the following percentages of maximum density in accordance with ASTM D 1557.
 - 1. Building Slabs: Compact top 12 inches of subgrade and each layer of backfill or fill material at 90 percent relative compaction.
 - 2. Lawn or Unpaved Areas: Compact top 12 inches of subgrade and each layer of backfill or fill material at 90 percent relative compaction.
 - 3. Vehicular pavements: The upper 12 inches of pavement subgrade soils shall be compacted to at least 95 percent relative compaction.
 - 4. Exterior Concrete Slabs: Scarify to a minimum depth of 8" and compact to at least 90 percent relative compaction.
- D. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
 - 1. Should grading be performed during or following extended periods of rainfall, the moisture content of the near-surface soils may be significantly above the optimum moisture content. Remove and replace or scarify and air dry soil material that is too wet to permit compaction to specified density.

2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.8 FOUNDATIONS

- A. Foundations shall be underlain by a minimum of 12 inches of newly constructed engineered fill placed and compacted as required above.
- B. Prior to placing steel or concrete, footing excavations shall be cleaned of all debris, loose or soft soil and water. All footing excavations shall be observed by project geotechnical engineer just prior to placing steel or concrete to verify compliance.

3.9 EXTERIOR FLATWORK

- A. Exterior flatwork should be underlain by at least 4 inches of aggregate base rock conforming to Caltrans Class 2 standards that is compacted to a minimum of 92% relative compaction.
- B. The exterior flatwork should be poured separately from building foundations so that they act independently of the walls and foundations. Exterior finish grades should be sloped a minimum of 2% away from interior slab areas to preclude ponding of water adjacent to the structures.
- C. Soils below exterior flatwork should be scarified to a depth of 6 inches and be compacted to a minimum of 92% of the Modified Proctor Maximum Density at a moisture content at least 2% greater than the optimum moisture content. This may require moisture conditioning the soil.
- D. Once slab subgrade soil has been moisture conditioned and compacted, the soil shall not be allowed to dry prior to placement of aggregate base and concrete. If allowed to dry, the moisture content of the soil shall be restored by sprinkling or wetting prior to placement.

3.10 FLEXIBLE PAVEMENT

- A. Prepare subgrades as specified above.
- B. The upper 6 inches of pavement subgrade should be compacted to at least 92% of the maximum dry density of the soil at a moisture content at least 2% above the optimum moisture content of the subgrade. All aggregate base and subbase materials should be compacted to at least 95% of the maximum dry density. Where aggregate base or aggregate sub-base layers are thicker than 6 inches, they should be compacted in two lifts.
- C. A separation geotextile shall be used between the pavement (and any rigid pavement sections) and the subgrade, in accordance with Caltrans recommendations for pavements over subgrades with R-Values less than 20. The geotextile may be either Mirafi 600X (woven), Mirafi 160N (non-woven), or approved equal.

3.11 RIGID PAVEMENT

- A. Concrete pavement should be supported on a minimum of 6 inches of Caltrans Class 2 aggregate base rock compacted to 95% of the aggregate base's maximum dry density over 6 inches of scarified and recompacted subgrade, compacted to 92% of the soil's maximum dry density at a moisture content at least 2% above the soil's optimum moisture content.
- B. A separation geotextile shall be used between the pavement (and any rigid pavement sections) and the subgrade, in accordance with Caltrans recommendations for pavements over subgrades with R-Values less than 20. The geotextile may be either Mirafi 600X (woven), Mirafi 160N (non-woven), or approved equal.

3.12 GRADING

- A. Provide smooth finished surfaces within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated on Drawings, or between such points and existing grades.
- B. Grade areas outside of building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, within the following tolerances above or below required finish grade.
 - 1. Lawn and Unpaved Areas to Receive Topsoil: 0.10 foot
 - 2. Pavements and Walks: Line, grade and cross-section, 0.10 foot
 - 3. Structures: 0.10 foot.
- C. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.
- D. Grade fill under building slabs smooth and even, free of voids, to required elevation. Provide final grades with a tolerance of plus or minus 1/4 inch in 10 feet.

3.13 FIELD QUALITY CONTROL

- A. See Section 01 45 00 Quality Control, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D6938.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), or AASHTO T 180.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no additional cost to the College.

3.14 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Comply with the applicable provisions of Section 01 50 13 Construction Waste Management and Disposal.
- B. Remove excess excavated material, trash, debris and waste materials and dispose of it off the College's property.
- C. Except for stripped topsoil or other material indicated to remain College property, cleared materials shall become the Contractor's property and shall be removed from the Project site.
- D. Contractor is responsible to coordinate all soil testing, reporting, and accounting as required by the governing entity for soils disposal.

3.15 PROTECTION

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.
- C. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- D. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.
- E. Groundwater: The Contractor shall provide, maintain, and monitor a dewatering system that includes well points, deep well drainage trenches, and sumps as required to lower and control

ground water in order to facilitate excavation, construction of structures, and placement of fill materials under dry conditions.

3.16 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with the applicable provisions of Section 01 50 13 Construction Waste Management and Disposal including, but not limited to:
 - 1. Separate packaging materials by type and place in locations designated by the Contractor.
 - 2. Place unused scrap material in locations designated by the Contractor.

3.17 SOIL EXPANSION

- A. The shallow native soil of the site is moderately expansive in nature (plasticity index of 28). As the groundwater table depth is shallow, the water content of the soils is unlikely to change significantly so the expansive and shrinkage qualities of the soils is less likely to cause issues in the future.
- B. As recommended in Section 3.2, the top 12 inches of the Site that will receive fill should be over-excavated, moisture conditioned to at least 3% wet of optimum, and then be compacted to 90% of the soil's maximum dry density.

3.18 MOISTURE BARRIER

- A. A moisture barrier shall be installed under the slab (15-mil Stego, Grace FlorPrufe or equivalent). The structural engineer shall determine whether a sand layer should be installed above the moisture barrier to aid in curing of the overlying concrete. A minimum 4-inch-thick layer of clean open-graded $\frac{3}{4}$ -inch maximum particle size rock or gravel should be placed beneath slabs-on-grade to provide a capillary moisture break. This material should be compacted with a vibratory plate or roller.

3.19 STORMWATER POLLUTION PREVENTION

- A. The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) and shall apply for coverage under the Construction General Permit, Waste Discharge Requirements Order No. 2009-0009 DWQ, as amended by 2010-0014 DWQ, (National Pollutant Discharge Elimination System (NPDES) Permit No.CAS000002 prior to commencement of construction activities.
- B. All submittals listed below shall be submitted to the Owner's Representative 21 days prior to groundbreaking to allow for review and acceptance by the Owner's Representative. No sitework may occur prior to review and certification of the submittals.
- C. Construction projects resulting in land disturbance of one acre or more shall submit Permit
- D. Registration Documents (PRDs) and a Post-Construction BMP Map. PRDs shall be electronically submitted 21 days prior to commencement of construction activity using the State Water Resources Control Board's Storm Water Multi-Application Report Tracking System (SMARTS) at <http://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin>
- E. Contractor must register as a Data Submitter in SMARTS and provide their user ID# to the Owner's Representative prior to uploading PRDs. The following information shall be submitted and must be deemed complete by SMARTS, before a WDID number will be issued confirming coverage under the General Construction Permit.
- F. The Post-Construction BMP Map shall be submitted electronically to the Owner Representative with the initial PRDs. The Post-Construction BMP Map shall identify the storm water drainage patterns, drainage management areas, final impervious surfaces, vegetated areas, and all post-construction BMPs.

- G. The Contractor shall be responsible for the implementation of the SWPPP in accordance with the CGP until an NOT has been filed.
- H. Inspections shall be performed weekly, pre-storm, post-storm and at least once each 24-hour period during qualifying storm events by the QSP or a trained representative of the QSP. Non-storm water discharge observations shall be performed quarterly. A qualifying storm event has a 50 percent or greater probability of precipitation. Repairs and design changes to BMPs shall be implemented within 72 hours of identification.
- I. Installation of all post-construction BMPs shall be in accordance with CASQA's New Development and Redevelopment Stormwater Best Management Practice Handbook and Municipal Stormwater Best Management Practice Handbook.
- J. Retention of Records - All required storm water records must be maintained by the discharger for 3 years from the date the Notice of Termination (NOT) was approved by the RWQCB. Contractor shall provide copies of stormwater documents, inspections and reports to the Owner's representative at project completion.

END OF SECTION 31 20 00

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SECTION 31 22 19
FINISH GRADING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all labor, materials, services and equipment indicated on Drawings and/or herein specified to complete all Landscape Grading Work.
- B. Finish grading shall consist of scarifying and establishing finish grade to conform to the contours, grades, line and shapes as indicated on the Drawings, and insuring that all landscape areas are uniformly graded to an outlet.

1.2 DEFINITIONS

- A. Subgrade: Surfaces upon which additional specified materials are to be placed, prepared or constructed.
- B. Rough grade: The establishment of grades to one-tenth (1/10) foot plus or minus tolerance of grades required to accomplish the Work described in other documents and drawings.
- C. Finish grade: The establishment of grades to a plus or minus tolerance of final grades as indicated on Drawings. Tolerances are specified in applicable documents of the specifications (i.e. Planting, Decorative Concrete, Decomposed Granite, etc.)
- D. Grading intent: Spot elevations (grades) and contours are indicated based on the best available data. Drawings are referenced to provide additional site grading data. The intent is to maintain constant slopes between spot elevations. If a spot elevation is determined to be in error, or the difference in elevation between points change, contact the College's Representative immediately for field adjustments of spot elevations.

1.3 EXISTING UTILITIES

- A. Contractor is responsible to contact Underground Service Alert (USA North) at 811 and mark the location of all existing utilities before commencing Work.
- B. Refer to the Drawings for information on proposed site utilities and their locations.
- C. Retain and protect in operating condition all active utilities traversing the site designated to remain.
- D. Where existing utilities not indicated on the Drawings are encountered, support, shore up, protect same and immediately contact the College's Representative for continuance and/or relocation of such services.

1.4 PROTECTION OF EXISTING CONDITIONS AND ADJACENT PROPERTIES

- A. Use all means necessary to protect existing conditions designated to remain, newly constructed conditions and adjacent properties. Avoid any encroachment on adjacent properties.
- B. Prevent damage to existing benchmarks, pavement and utility lines. In the event of damage or loss, immediately make all repairs and replacements required to the satisfaction of the College's Representative and at no additional cost to the College.

1.5 EXISTING TREES

- A. The Contractor shall protect the tops, trunks and roots of all existing trees on/or near the project site that are designated to remain.
- B. Do not permit the parking of vehicles, or storage of materials or equipment under the dripline of existing trees.

1.6 QUALITY ASSURANCE

- A. Finish grades shall conform to contours, grades, lines and shapes, as indicated on Drawings, with uniform slopes between finish grades or between finish grades and existing grades.
- B. Establish finish landscape grades in a continuous, uniform line, resulting in a uniform surface with positive drainage and without ridges or water pockets.
- C. Finish landscape grade tolerance shall be .04 feet plus or minus of final grades indicated on Drawings.

1.7 SUBMITTALS

- A. If specified under this contract, provide one (1) cubic foot sample of topsoil material for the College's Representative's approval prior to delivery to the site, but in any case, prior to placement.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

- A. Rough grades shall be within plus or minus .10 foot of final finish grades as indicated on plans. If any discrepancies exist, notify the College's Representative immediately for direction.
- B. Contractor shall be responsible for bringing rough grades into conformity with finish grades as indicated on the plans. Comply with tolerances specified in this document and as specified in applicable documents of the specifications (i.e. concrete, asphalt, planting, etc.).
- C. Conduct work in an orderly manner. Dirt shall not be permitted to accumulate on streets or sidewalks or washed into storm drains.
- D. Use all means required to prevent the erosion of freshly graded areas during construction and until such time as proposed hard surfaces and landscaping have been constructed.

3.2 LAYOUT

- A. Layout of all work under this Section shall be made by a licensed surveyor.
- B. Maintain all bench marks, control monuments and stakes. Protect from damage and dislocation.
- C. If any discrepancies are found by the surveyor between the Drawings and actual site conditions, the College's Representative reserves the right to make minor adjustment in Work Specified as necessary to accomplish the intent of the Contract Documents without increased cost to the College.

3.3 SUBGRADE PREPARATION

- A. Cut out areas, to subgrade elevation, which are to receive paving and sidewalks.
- B. Scarify subgrade to a depth of eight (8) inches and bring to uniform moisture content.
- C. Bring subgrade to required levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- D. Slope grade away from building minimum two-and-one-half (2-1/2) inches in ten (10) feet (2%) unless indicated otherwise on Drawings.
- E. Compact subgrade to the following:
 - 1. 6 inch depth at 95% relative compaction in accordance with ASTM D1557-78 for pavement areas.
 - 2. 12 inch depth at 85% relative compaction in accordance with ASTM D1557-78 for landscape areas.

3.4 FINISH LANDSCAPE GRADING

- A. Scarify or rototill to a 6" depth all planting areas prior to finish grade operations and work until uniform and free from large clods larger than one (1) inch in greatest dimension.
- B. Finish grade shall conform, after compaction, to shapes, spot elevations and contours as indicated on Drawings, with uniform levels or slopes between finish elevations or between finish elevations and existing elevations.
- C. Soil amendment and preparation shall comply with Section 32 90 00 Planting.
- D. Spread excess soil material excavated from plant pits to establish subgrades in surrounding planting areas.
- E. Top six (6) inches of all areas to be planted shall be free of stones, stumps or other deleterious matter one (1) inch in greatest dimension.
- F. Compact soil in planting areas to 85% relative compaction in accordance with ASTM D1557-78.
- G. Fine grade all planting areas to a smooth, loose and uniform surface. Eliminate uneven areas, ridges and depressions.
- H. Shrub/ground cover planting areas shall be graded three and one-half (3-1/2) inches below adjacent paved areas, sidewalks, valve boxes, mow bands, drains, etc. in order to receive three (3) inch depth of mulch, establishing final grade one-half (1/2) inches below these surfaces.
- I. Turf areas shall be graded 1/2 inch in hydroseed, and 1/2 inch in sod, below adjacent paved area, sidewalks, valve boxes, mow bands, drains, top of seat walls etc. in order to receive turf, establishing final grade flush with these surfaces.

3.5 OBSERVATION SCHEDULE

- A. Normal progress observations shall be requested by the Contractor from the College's Representative as per observations listed in Sections: 32 84 00 Planting Irrigation, and 32 90 00 Planting.

3.6 CLEAN UP

- A. Remove all trash, excess soil, or rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site.
- B. The Contractor shall leave the site area broom-clean and shall wash down all paved areas within the Contract area, leaving the premises in a clean condition acceptable to the College's Representative.

END OF SECTION 31 22 19

SECTION 31 22 19.13
LANDSCAPE GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope of Work: Provide landscape grading in landscape areas as shown and specified including: removal of rock, gravel and other construction related material, sub-grade treatment, ripping and rough grading, soil replacement, and finish grading.
- B. Related Sections:
 - 1. Section 32 84 00 Planting Irrigation
 - 2. Section 32 90 00 Planting

1.2 SUBMITTALS

- A. Submit documentation to College's Representative at least 30 days before grading certifying that enough soil is available, listing sources of materials.
- B. Submittals shall include but not be limited to the following:
 - 1. Soil test reports of existing site soil (after rough grading) – one test per one thousand square feet of planted landscape area.
 - 2. Soil test reports of any import topsoil (one test per fifty cubic yards of import)
 - 3. Two-gallon sample from each import topsoil source. The sample shall be a mixture of the random samples taken around the source stockpile or field. The soil sample shall have soil peds (soil fragments or clods) intact that represent the size and quantity of expected peds in the final delivered soil.
- C. Quality Assurance Soil Testing - soil tests shall include the following information:
 - 1. Particle size analysis (percentage dry weight) and USDA soil texture analysis.
 - 2. pH and buffer pH
 - 3. Percent organic content by oven dried weight.
 - 4. Nutrient levels by parts per million including: phosphorus, potassium, magnesium, manganese, iron, zinc and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified.
 - 5. Soluble salt by electrical conductivity of a 1:2 soil water sample measured in Milliohm per cm.
 - 6. Cation Exchange Capacity (CEC).

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Weather: Do not mix, deliver, place or grade soils with moisture above field capacity.
- B. Protect soil and soil stockpiles, including the stockpiles at the soil blender's yard, from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Cover stockpiles

with plastic sheeting or fabric at the end of each workday.

1.4 COORDINATION AND SCHEDULING

- A. Protection of College Property: See the Division I: General Requirements section regarding special requirements.
- B. Protection of Existing Trees and Plantings: See the Division I: General Requirements section regarding tree and plant protection.
- C. Scheduling: Landscape grading operations shall be performed prior to irrigation installation or other utility infrastructure shallower than 24 inches.
- D. Observation Schedule. Contractor shall notify College's Representative in advance for the following site visits, according to the time indicated:
 - 1. Pre-landscape grading conference - 7 days.
 - 2. Pre-rip inspection - removal of construction debris and deleterious material from soil surface and any known contaminants below surface (lime-treated material, base rock etc.) - 48 hours.
 - 3. Post rip and scarification – 48 hours.
 - 4. Incorporation of approved topsoil or import topsoil - 48 hours.
 - 5. Incorporation of organic amendment or compost into top 12 inches, see also Section 32 90 00 Planting.

1.5 SAMPLES AND TESTS

- A. College's Representative reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request. Rejected materials shall be immediately removed from the site at Contractor's expense. Cost of testing of materials not meeting specifications shall be paid by Contractor.
- B. Contractor shall have soil tested by an independent soil testing laboratory.

PART 2 - PRODUCTS

2.1 IMPORT TOP SOIL

- A. Imported Topsoil definition: Fertile, friable soil containing less than 5% total volume of the combination of subsoil, refuse, roots larger than 1 inch diameter, heavy, sticky or stiff clay, stones larger than 1 inches in diameter, noxious seeds, sticks, brush, litter, or any substances deleterious to plant growth. The percent (%) of the above objects shall be controlled by source selection not by screening the soil. Topsoil shall be suitable for the germination of seeds and the support of vegetative growth. Imported Topsoil shall not contain weed seeds in quantities that cause noticeable weed infestations in the final planting beds. Imported Topsoil shall meet the following physical and chemical criteria:
 - 1. Soil texture: USDA loam, sandy clay loam or sandy loam with clay content between 15 and 25%. And a combined clay/silt content of no more than 55%.
 - 2. pH value shall be between 5.5 and 7.0.
 - 3. Percent organic matter (OM): 2.0-5.0%, by dry weight.
 - 4. Soluble salt level: Less than 2 mmho/cm.

- B. The pH of saturated paste shall be between 5.5 and 7 without high qualitative lime content. The sodium absorption ratio (SAR) shall not exceed six and the electrical conductivity (ECe) of the saturation extract of this soil shall not exceed 2.0 milliohms per centimeter at 25 degrees centigrade. The boron content shall be no greater than one part per million as measured on the saturation extract.
- C. Imported Topsoil shall be a harvested soil from fields or development sites when possible. The organic content and particle size distribution shall be the result of natural soil formation. Manufactured soils where coarse sand, composted organic material or chemical additives has been added to the soil to meet the requirements of this specification section shall not be acceptable. Retained soil peds shall be the same color on the inside as is visible on the outside.
- D. Imported topsoil for planting soil shall NOT have been screened and shall retain soil peds or clods larger than two inches in diameter throughout the stockpile after harvesting.
- E. Stockpiled existing topsoil at the site meeting the above criteria may be acceptable, but must be approved by the College's Representative in writing.

PART 3 - EXECUTION

3.1 SOIL CLEANUP, REPLACEMENT AND PREPARATION

- A. Cleanup and preparation: Contractor shall review site conditions and remove all visible stones, stumps, gravel, concrete, asphalt, and other construction debris and deleterious materials including any and all germinated weeds prior to commencing finish grading work in landscape areas.
 - 1. At the conclusion of flatwork installation but prior to the commencement of irrigation system installation, the top twelve inches of soil shall be removed from all landscape areas and disposed of off-site. This shall be considered the minimum requirement for dig-out of all landscape areas on a project unless directed otherwise by the College Representative, pending review of site soil conditions during this phase.
 - 2. The next lower 12 inches of soil shall be ripped and then cleared of all concrete, asphalt, and other construction debris and deleterious materials, and all stone and gravel larger than 1 inch in diameter, that are brought to the surface as a result of cultivations. However, if subsoil in this profile consists of greater than 15% rock, gravel or other debris of any size by volume it shall be removed entirely and replaced with imported top soil. Cultivation shall be by an excavator or other ripping equipment. Call Underground Service Alert (USA) before beginning cultivation operations. Subsoil shall be compacted to 85 percent relative density prior to backfilling with topsoil.
- B. Soil replacement with stockpiled or imported topsoil
 - 1. Place a minimum of 12 inches of clean topsoil into all planting areas after the subsoil has been ripped to a depth of 24 inches from finished grade. Clean topsoil can be stockpiled on site, but must be kept clear and free of debris and rock, and then used as needed for landscaping upon written approval by the College's Representative.
 - 2. In areas where site soil has been compacted by construction activity, or building foundations have been over-excavated and re-compacted, additional mitigation measures may be required to improve soil and drainage conditions for planting. These may include, but are not limited to: the installation of subsurface drainage systems for shrub and groundcover areas and individual tree pits; removal of additional soil from the planting areas beyond what is specified above until acceptable drainage and compaction levels are

achieved; aeration tubes installed; radial soil trenches dug out around each tree; or other measures as determined and approved by the College's Representative. Mitigation measures shall be completed by the contractor as required at no additional cost to the College. See Planting Installation paragraph for more information and additional related requirements.

3.2 FINISH GRADING

- A. When preliminary grading has been completed and the soil is sufficiently dry to be readily worked, add soil amendments to a depth of twelve inches (see Section 32 90 00 Planting) and grade planting areas to the elevations indicated on the Drawings' details. Minor adjustments of finish grades will be made at the direction of the College's Representative. Finish grade will be a smooth, even, and uniform plane with no abrupt change of surface. Soil areas adjacent to the building will slope away from the building to allow a natural run-off of water, and surface drainage will be directed as indicated on the Drawings by remodeling surfaces to facilitate the natural run-off of water. Low spots and pockets will be graded to drain.
- B. The finish grade of all landscape areas shall be one inch below the grade of adjacent pavement, walks, curbs, or headers extending eight to twelve inches beyond edge of paving, transitioning to three inches beyond that to allow for depth of mulch layer. An exception to the above requirements will be made wherever drainage conditions may require flush grades as directed by the College's Representative.
- C. The finish grade of all sod lawn areas will match grade of adjacent pavements walks, curbs or headers. An exception to the above requirements will be made wherever drainage conditions may require flush grades as requested by the College's Representative.
- D. Contractor shall be responsible for finish grading to ensure positive drainage and proper slope to drains. All flow lines, designated or not, are to be graded and maintained to allow free flow of surface water, and are to conform to the intent of the Drawings after thorough settlement and compaction of the soil.
- E. Dispose of any unacceptable or excess soil legally at an offsite location.

3.3 CLEAN UP

- A. During the progress of the Work, the Contractor shall keep the Project site in a neat and clean condition that is free of debris to the satisfaction of the College's Representative. All materials and debris accumulated in conjunction with completing this Work shall be legally recycled or disposed of by Contractor off campus. Remove all trash, excess soil, empty plant containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site.
- B. The Contractor shall leave the site area broom-clean and shall wash down all walkways and other paved areas, leaving the premises in a clean and safe condition.
- C. Promptly remove soil and debris created by landscape grading work from paved areas and building walls. Clean wheels of vehicles before leaving site to avoid tracking soils onto surfaces of roads, walks, or other paved areas.

END OF SECTION 31 22 19.13

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes trenching, backfilling and compacting for utilities.
- B. Related sections
 - 1. Section 01 45 00 Quality Control
 - 2. Section 31 20 00 Earth Moving

1.2 REFERENCES

- A. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³); 2000.
- B. Manual of Warning Signs, Lights and Devices for Use in Performance of Work Upon Highways, issued by the California State Department of Transportation.
- C. Office of Safety and Health Act (OSHA) Construction Safety Orders
- D. California Code of Regulations Title 8: Construction Safety Orders.

1.3 DEFINITIONS

- A. Finish Grade Elevations: Indicated on Drawings.
- B. State Standard Specifications: State of California, Business and Transportation Agency, Department of Transportation (Caltrans), Standard Specifications, latest edition, excluding Sections pertaining to measurement and payment items.
- C. Relative Compaction: Ratio, expressed as a percentage of field dry density as compacted to a maximum dry density of representative sample of the same material determined by American Society for Testing and Materials (ASTM) Test Method D1557 (c).

1.4 SUBMITTALS

- A. Conform to the requirements of Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data for Products specified.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- F. Submit name of imported materials source.
- G. Deliver samples of backfill and fill materials to College's Representative in quantities sufficient for testing. Deliver at least 15 days prior to use.

1.5 WARRANTY

- A. The Contractor shall warrant against settlement for a period of one year after the date of final acceptance, and shall repair damage caused by settlement within that time. For the purpose of this Specification, settlement will be deemed to have occurred if on paved surfaces, the depression falls 3/8-inches below the average of the sides of the uncut portion.

PART 2 - PRODUCTS

2.1 BEDDING AND BACKFILL MATERIALS

- A. Bedding: bank sand; washed, free of silt, clay, loam, friable or soluble materials and organic matter; graded as follows: Sand bedding shall have a minimum sand equivalent of 45 and shall be uniformly graded from No. 4 to 200 mesh screen.
- B. Backfill: Native backfill shall be selected material excavated from the trench. In all cases it shall be capable of compaction to at least the relative compaction required. In-place moisture content shall not be more than 5 percent over optimum when the material is silty or clayey and will not provide a stable subsurface.

2.2 SOURCE QUALITY CONTROL

- A. See Section 01 45 00 Quality Control for general requirements for testing and analysis of soil material.
- B. Provide materials of each type from same source throughout the Work.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Preparation of Work
 - 1. Underpin adjacent structures, which may be damaged by excavation Work, including utilities.
 - 2. Maintain trench crossings for vehicular and pedestrian traffic at street crossing, driveways and fire hydrants.

3.2 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. See Section 31 20 00 Earth Moving for additional requirements.

3.3 CONTROL OF WATER AND DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding the site and surrounding area. Provide dewatering equipment necessary to drain and keep excavations and site free from water.
- B. Dewater during backfilling operation so that groundwater is maintained at least one foot below level of compaction effort.

- C. Protect subgrades from softening, undermining, washout and damage by rain or water accumulation.
- D. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations.
- E. Maintain dewatering system in place until dewatering is no longer required.

3.4 PIPE BEDDING

- A. Bedding Excavation: Excavate trenches below grade of pipe bottom to the depth indicated on drawings.
- B. Stabilization of Trench Bottom: When trench is unstable due to wet or spongy foundation, stabilize trench bottom with gravel or crushed rock. The College's Representative will determine suitability of trench bottom and amount of gravel or crushed rock needed to stabilize soft foundation. Remove and replace soft material with gravel or crushed rock when directed by College's Representative.
- C. Placement of Bedding Material: Place sufficient bedding material in trench bottom up to grade of bottom of pipe. Relative compaction of tamped material shall be not less than 90 percent relative compaction. Place and compact additional bedding material to provide uniform bearing under the full length of the pipe to a minimum width of 60 percent of its external diameter.

3.5 TRENCHING

- A. Work Included
 - 1. Perform operations necessary to excavate earth, regardless of character and subsurface conditions, from the trench or adjacent thereto, and to place trench stabilization, pipe bedding, pipe cover, trench water removal, trench backfill and base, as shown on the Drawings, as well as providing traffic control and regulation through construction areas.
 - 2. The Contractor shall do excavation of whatever substance is encountered to the lines and grades shown on the Drawings. Materials suitable for use as backfill shall be piled in an orderly manner a sufficient distance from the edge of the trench to avoid overloading and to prevent sliding into the trench.
 - 3. The Contractor shall do such grading or Work as is necessary to prevent surface water from entering the excavation.
 - 4. Demolish and remove existing pavement, curb and gutter, and other Project Site facilities as shown on the Drawings allow Project operations. Existing asphalt concrete pavement to be removed shall be saw cut in longitudinal neat straight lines while maintaining the cuts vertical for the full depth of the asphalt concrete pavement. Portions of existing concrete curbs, gutters and sidewalks to be removed to permit new construction shall be cut using a concrete saw to provide neat straight lines with vertical cuts.
 - 5. Maximum allowable open trench is 600 L.F. at any one time. Trenches outside the enclosure of the temporary construction fence are to be covered or otherwise protected at the end of each work day.
 - 6. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
 - 7. Do not interfere with 45 degree bearing splay of building foundations.
 - 8. Cut trenches wide enough to allow inspection of installed utilities.

9. Hand trim excavations. Remove loose matter.
 10. Remove large stones and other hard matter which could damage piping or impede consistent backfilling or compaction.
 11. Remove lumped subsoil, boulders and rock up to 1/3 cu. yd. in size.
 12. Remove excavated material that is unsuitable for re-use from Project Site.
 13. Stockpile excavated material to be re-used in area designated on Project Site in accordance with Section 31 20 00 Earth Moving.
 14. Remove excess excavated material from Project Site in accordance with provisions in Section 31 20 00 Earth Moving.
- B. Width of Trench: Except where otherwise specifically permitted by College's Representative, sides of trenches shall be vertical, shored, as required, and shall be of uniform width from top to bottom. Trenches shall be of a width as shown on the Drawings.
- C. Trench Backfill: Native backfill shall be compacted by machine in uniform layers not exceeding 0.67 foot. Backfill shall be compacted to a relative compaction of not less than 90 percent to within 1 foot of subgrade. The upper 1 foot of subgrade shall be compacted to 95 percent; 85 percent compaction will be acceptable in undeveloped areas.

3.6 PREPARATION FOR UTILITY PLACEMENT

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.
- D. Buried pipe shall have at least 36 inches of cover and 12 inches of clearance from other utilities.

3.7 BACKFILLING

- A. Backfill to contours and elevations indicated using unfrozen materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other Work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.
- H. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise on the Drawings. Make gradual grade changes. Blend slope into level areas.
- I. Reshape and re-compact fills subjected to vehicular traffic.

3.8 TOLERANCES

- A. Top Surface of General Backfilling: Plus or minus 0.10 foot from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.10 foot from required elevations.

3.9 FIELD QUALITY CONTROL

- A. See Section 01 43 00 Quality Assurance for general requirements for field inspection and testing.
- B. The College will make soils tests when advised by the Contractor that in the Contractor's opinion sufficient densities have been achieved. If the first tests in any areas fails, the Contractor shall pay for further testing in that area until specified densities are obtained. The College's Representative shall determine the number and location of tests required. Contractor shall provide a backhoe and operator upon request at no additional cost to the College.
- C. Lights, flags, and other warning and safety devices for street and highway work shall conform to the requirements set forth in the current Manual of Warning Signs, Lights and Devices for Use in Performance of Work Upon Highways, issued by the California State Department of Transportation.
- D. Preparation, excavation and trenching shall comply with California Code of Regulations Title 8: Construction Safety Orders.

3.10 CLEANING

- A. Leave unused materials in a neat, compact stockpile during progress of work.
- B. Remove unused stockpiled materials. Leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

3.11 DISPOSAL OF EXCESS EXCAVATED MATERIAL

- A. The Contractor shall remove and dispose of all excess excavated material to a suitable site. The proper and legal disposal shall be the responsibility of the Contractor.

3.12 PROTECTION

- A. Groundwater: The Contractor shall provide, maintain, and monitor a dewatering system that includes well points, deep well drainage trenches, and sumps as required to lower and control ground water in order to facilitate excavation, construction of structures, and placement of fill materials under dry conditions.

END OF SECTION 31 23 33

SECTION 31 62 13.23
PRESTRESSED CONCRETE PILES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of Division 1 shall apply to all Work of this section.

1.2 SCOPE

- A. The work shall consist of furnishing all plant, labor, equipment, and materials, and performing all operations as required to install driven, precast concrete piles.

1.3 RELATED WORK (See also Table of Contents)

- A. Cast-in-Place Concrete: Section 03 30 00.
B. Reinforcing Steel: Section 03 21 00.

1.4 QUALITY ASSURANCE

A. General:

1. Fabricator Qualifications: All piles shall be installed by a contractor qualified to install the type of pile to be driven in accordance with the Contract Documents, and under conditions existing at the site. The minimum requirements for qualifications shall be five (5) years pile driving experience and evidence of the satisfactory completion of ten (10) pile installations comparable in scope to the work specified hereunder, with sufficient production capacity to produce the required units without causing delay in work. Fabricator must be an active member of the Prestressed Concrete Institute (PCI) and participate in its Plant Certificate Program.
2. Fabrication Qualifications: Produce precast concrete piles at a fabricating plant engaged primarily in the manufacturing of similar units, unless plant fabrication or delivery to project site is impractical.
If units are produced at locations other than precast concrete fabricating plants, maintain procedures and conditions for quality control which are equivalent to plant production. Comply with PCI MNL - 116 "Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products."
3. A Geotechnical Engineering Report has been prepared for this site containing information on subsurface conditions and pile driving operations. That report is available for review on request.
The Owner does not guarantee that the information contained in the Geotechnical Engineering Report is correct nor that the conditions revealed at the actual boring locations will be continuous over the entire site. This report was prepared for purposes of design only. Making the report available to contractors shall not be construed in any way as a waiver of this position. The Contractor shall be responsible for any conclusions he may draw from this report. Should he prefer not to assume such risk, he is under obligation to employ his own experts to analyze available information and/or make his own tests upon which to base his conclusions.
4. Before any piles are driven, the Contractor shall examine all excavation faces from the standpoint of stability during pile driving. If, in his opinion, the excavation faces would be unstable, he shall not proceed until corrective action has been taken.
5. During production pile driving the Contractor shall monitor adjacent structures to evaluate their response to hammer-induced vibrations. Should adverse reaction of such structures or streets be observed, the Contractor shall notify the Architect and shall propose means

of minimizing damage. Contractor shall coordinate with adjacent residents and coordinate hours during which pile driving activities will occur to minimize disturbance.

- B. Standards and References: (Latest Edition unless otherwise noted):
1. American Concrete Institute (ACI).
 - a. ACI 301 – "Specifications for Structural Concrete for Buildings".
 - b. ACI 315 – "Details and Detailing of Concrete Reinforcing".
 - c. ACI 318 – "Building Code requirements for Structural Concrete".
 2. American Society for Testing and Materials (ASTM).
 - a. ASTM A82 – "Cold Drawn Wire for Concrete Reinforcement".
 - b. ASTM A185 – "Welded Steel Wire Fabric for Concrete Reinforcement".
 - c. ASTM A615 – "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement".
 - d. ASTM A416 - Specification for Steel Strand, Uncoated, Seven-Wire, Stress-Relieved for Prestressed Concrete.
 3. Concrete Reinforcing Steel Institute (CRSI) – "Manual of Standard Practice".
 4. California Building Code (CBC), with State of California Amendments.
 5. Precast / Prestressed Concrete Institute (PCI) – "Design Handbook".
 6. Caltrans Standard Specifications.
- C. Submittals: (Submit under provisions of Section 01 33 00).
1. Shop Drawings: Pile manufacturer shall provide shop drawings and calculations signed by a registered Professional Engineer for loading conditions as shown on Drawings. Pile design and transverse reinforcing conforming to CBC 1810A to be designed by pile manufacturer.
 2. Equipment: Submit at least ten (10) days before driving commences, all pertinent information regarding pile driving equipment.
 3. Load Test Apparatus: Contractor shall submit proposed load test reaction system capable of sustaining the required resistances contained within the Geotechnical Engineering Report.
 4. Concrete Mix Designs: Submit mix proportions and supporting data for each mix to be used.
 5. Submittals as required by Sections 03 21 00 and 03 30 00.
- D. Tests and Inspections:
1. Provide special inspections and testing as described in the "Statement of Structural Special Inspections and Testing" within the structural drawings.
 2. Load-bearing Test Reports: Submit copies of test reports for each load-bearing test within 2 days after completion of tests.
 3. Driving Records: Submit three copies of driving record of each pile not later than 2 days after driving. Include project name and number, name of Contractor, pile location and number, computed pile capacity, type and size of hammer used, type of pile driving cap used, rate of operation of pile driving equipment, pile dimensions, elevation of point, elevation of butt before and after cut-off, ground elevation, continuous record of number of blows for each foot of penetration, pile deviation, pile uplift and reaction, and any unusual occurrences during pile driving.
 4. All test, indicator and production piles shall be driven under the observation of the Geotechnical Engineer.
 5. Test Pile Program:
 - a. General: The contractor shall drive and test two (2) piles of each of the types to be used on the project but with various tip elevations for purposes of determining final pile driving criteria. The driving and testing of the piles shall be performed immediately after driving of the indicator piles and shall conform to the following criteria.
 - b. Test Pile Location: The testing program shall be undertaken outside the location of any pile cap, at a location determined by the Geotechnical Engineer. The test piles and reaction piles shall be abandoned upon completion of the testing program and

shall be cut off at least twenty-four inches (24") below final subgrade. Test piles and reaction piles shall not be used for structural support.

- c. Pile Driving: Test piles shall be driven with a hammer having rated energy of at least sixty thousand (60,000) foot pounds per blow or as indicated in the Geotechnical Engineering Report.
Final tip elevation of test piles will be determined by the Geotechnical Engineer who will record and analyze the penetration resistance of each pile during installation. Test piles shall be cast to reach tip elevations as indicated in the Geotechnical Engineering Report. Test piles shall be driven in predrilled holes which have been drilled immediately prior to driving of each pile. The holes shall be as indicated in the report. Each test pile shall be driven in a predrilled hole before another test pile location is drilled.
 - d. Testing: The Contractor shall provide all equipment necessary to perform the testing program, including calibrated hydraulic jacks, and independent reference beam system acceptable to the Geotechnical Engineer, dial gauges reading directly to one thousandth inch (0.001"), necessary steel plates and shims, a manifold system using an electrical or nitrogen-operated pressure control system, flood lights for night testing, and an overall canopy to protect the reaction beam, reference beam, and testing equipment.
The Geotechnical Engineer will provide all engineering personnel for performance of the testing and evaluation of the results. Test loads shall be provided by the Geotechnical Engineer.
 - e. Reaction System: The Contractor shall provide a reaction system capable of safely sustaining the test loads when those loads are applied to and maintained upon any of the test piles. Installation of reaction piling and construction of the reaction system shall be the responsibility of the contractor. The reaction and test pile set up shall conform to the applicable provisions of the ASTM D1143 Test method. A plan of the proposed system shall be submitted to the Geotechnical Engineer prior to installation of piling.
6. Indicator Pile Program:
- a. Fifteen (15) concrete indicator piles matching production piles shall be manufactured and provided to extend to the elevations indicated in the Geotechnical Engineering Report. The indicator piles may be driven as production piles if properly staked out at locations recommended by the Geotechnical Engineer, with each pile either being driven to the proper butt elevation shown on the accepted plans or being stopped and cut-off at that elevation, as determined by the Geotechnical Engineer. Results of the indicator pile program will be used to establish production pile lengths and must be completed prior to commencing pile production.

1.5 PRODUCT, DELIVERY, STORAGE AND HANDLING

- A. Except for piles to be used for test purposes, materials ordered or delivered to project site prior to verification of assumed pile length, will be at Contractor's risk.
- B. After pile lengths are verified, deliver materials to project site in such quantities and at such times to assure continuity of pile driving operations to project schedule.
- C. Store piles in orderly groups above ground and blocked during storage to prevent distortion of members. Piles exhibiting variations beyond tolerance limits will be considered distorted and may not be used in the work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete: Minimum $f'c=6,000$ psi at 28 days, 4,000 psi at transfer of prestress, using ingredients for mix conforming to requirements of Section 03300, with 3/4 inch maximum size aggregate. Extensions to top of pile after driving may be concrete of $f'c=4,000$ psi if adequate for load.
- B. Prestressing Strands: Seven wire steel strand conforming to ASTM A416, Grade 270, low relaxation.
- C. Deformed reinforcement shall conform to ASTM A615, Grade 60.
- D. Smooth wire spirals shall conform to ASTM A82.

2.2 PILE TYPES

- A. Piles shall be of precast, prestressed concrete. Sizes and design loads are indicated on the structural drawings.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Following the driving of indicator piles, the Geotechnical Engineer shall establish the tip elevations or depths at which those piles meet the driving criteria. The cast lengths for the remaining production piles shall be established by the Contractor; however, the Geotechnical Engineer shall review the proposed cast lengths.
- B. Piles shall be fabricated under plant conditions to required lengths, sizes, and shapes with specified reinforcement. Piles shall be cast true and straight to within one-inch (1") maximum for full pile length on any face (measured by taut line from butt to tip), but with variations not to exceed one-quarter inch (1/4") in any ten-foot (10') length, and with smooth, even surfaces, free from voids.
- C. Piles shall conform to Section 50 (Prestressing Concrete), Section 51 (Concrete Structures), Section 52 (reinforcement), and Section 90 (Portland Cement Concrete) of Caltrans Standard Specifications, latest editions.
- D. Piles may be steam cured as per Caltrans Standard Specifications in which case a combination of steam and moist curing shall be accomplished for at least seven (7) days.
- E. Pile lengths shown on structural drawings are for bid purposes only. Actual lengths are to be determined by the indicator pile program.
- F. Conform to all requirements of CBC Chapter 18A and ACI 318.

3.2 PILE DRIVING

- A. Driving Caps: Equip hammer with cast steel or structural steel driving cap, with grooved base conforming to pile shape. Keep bearing surfaces of grooves true and smooth.
- B. Leads: Use fixed or rigid type pile driver leads that will hold pile firmly in position and alignment, and in axial alignment with hammer. Extend leads to within 2 ft. of elevation at which the pile enters ground.
- C. General: All piles shall be driven to meet the blow count criteria for the design loading established by the Geotechnical Engineer following completion of the indicator pile program, but not less than the specified maximum tip elevation (minimum depth). Piles may be driven

deeper to cutoff elevation, where damage to the pile will not occur. The suitability of over driving in lieu of cutting off precast piles shall be determined by the Contractor.

- D. Equipment: Pile driving equipment shall be in first class condition with piles properly held in correct position while being driven. The hammer shall develop at least sixty thousand foot-pounds (60,000 ft-lbs) of energy per blow.
- E. Driving and Inspection: All piles shall be driven straight and true at the locations shown on the Drawings.
 - 1. Driving of piles shall not be undertaken within ten feet (10') of concrete cured less than three (3) days.
 - 2. Heads of concrete piles shall be protected during driving with an approved cushion head block, which shall be maintained in good condition during the entire driving operation.
 - 3. Predrilling: Predrilled holes shall be provided for all piles. Predrilled holes shall be at least two inches (2") smaller in diameter than the minimum cross-sectional pile dimension, and shall extend no deeper than five feet (5') above the specified maximum tip elevations.
 - 4. Pile driving shall proceed only in the presence of the Geotechnical Engineer, who shall make a continuous record of the penetration resistance behavior during driving and elevation of cut-off of every pile.
- F. Continuously drive piles at locations indicated, to required point elevation and driving resistance established by driving and loading of test piles.
- G. Carefully maintain center of gravity for each group or cluster of piles to conform to locations shown on drawings.
- H. Carefully plumb leads and pile before driving. Take care during driving to prevent and to correct any tendency of piles to twist or rotate.
- I. When handling and driving long piles, take special precautions to ensure against overstress or leading away from a true position when driving.
- J. Alignment and Tolerances: Drive piles within the following maximum tolerances. Piles exceeding these tolerances shall be corrected as directed by the Structural Engineer (and approved by DSA) and at no increase in cost to the Owner. The Structural Engineer shall be compensated for additional design fees.
 - 1. Location: All piles shall be driven so that the center of the pile head is not more than three inches (3") from the design locations shown.
 - 2. Plumbness: No pile shall be more than two percent (2%) of its length out of plumb. Maintain 1" in 10'-0" from vertical, or a maximum of 4", measured when the pile is above ground, in leads.
 - 3. Batter Angle: Maximum 1" in 10'-0" from required angle; measured when pile is above ground, in leads.
- K. Backfill voids between pile and pre-excavated hole, using satisfactory soil materials.
- L. Heaved Piles: Provide recorded instrument observations made during pile driving to determine whether driven pile has lifted from its original seat during driving of adjacent piles. If uplift occurs, redrive affected piles to point elevation at least as deep as original point elevation with a driving resistance at least as great as original driving resistance.
 - 1. Survey level reading shall be taken on individual piles during at least the initial portion of the pile driving at locations designated by the Geotechnical Engineer. If it is determined that piles have been unseated, redriving of affected piles and all subsequent piles so affected shall be accomplished at no cost to the Owner.

- M. Damaged or Misdriven Piles: Damaged piles, and piles driven outside required driving tolerances will not be accepted and will be replaced with new piles.
 - 1. Cracking, splitting, distortion, bending, spalling or other damage sustained by piles during driving shall be corrected as directed by and without cost to the Owner.
 - 2. Additional piles required to replace damaged or misaligned piles shall be driven and all changes in pile cap design and construction, including costs of formwork, steel, concrete and labor shall be accomplished without cost to the Owner.
- N. Drive additional pile or piles where centerline deviation exceeds 3" and redesign indicates load on any pile exceeding 110% of design load.
- O. Piles rejected after driving may be abandoned and cut-off, and additional piles driven to replace rejected units at designated locations.
- P. Solidly fill spaces left by withdrawn piles, that will not be filled by new piles, using cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact throughout length of space.
- Q. Cutting Off: Tops of all piles projecting above cut-off elevation after driving shall be cut-off at the proper elevation, following approval of the Geotechnical Engineer, and ends shall be removed from the job site.
See details on drawings for notes relating to pile cut-off procedures.

3.3 CLEANUP

- A. Upon completion of pile driving, remove all equipment, excess materials, etc., and leave the site clean and free of debris.

END OF SECTION 31 62 13.23

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Aggregate base courses.

1.2 RELATED SECTIONS:

- A. Section 32 12 16 Asphalt Paving
- B. Section 32 13 13 Concrete Paving

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- C. Caltrans Standard Specifications:
 - 1. Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS, latest edition.

1.4 QUALITY ASSURANCE

- A. Provide source and gradation from current testing (less than four months from date submitted) in accordance with Section 01 33 00 Submittals.
- B. Furnish each aggregate material from single source throughout the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Coarse Aggregate Fill Type Class II: per Caltrans Standard Specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify substrate is dry and has been inspected and verify gradients and elevations are correct.

3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

- A. Spread aggregate over prepared substrate to the total compacted thickness as shown on the plans.

END OF SECTION 32 11 23

SECTION 32 12 16
ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphaltic concrete paving, wearing, binder and base course.
2. Surface sealer.
3. Aggregate subbase course.

1.2 REFERENCES

A. Asphalt Institute:

1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types
2. AI MS-19 - Basic Asphalt Emulsion Manual.

B. ASTM International:

1. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
2. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

C. Caltrans Standard Specifications:

1. Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS, latest edition.

1.3 PERFORMANCE REQUIREMENTS

- A. Paving: Designed in accordance with Caltrans Standard Specifications, Section 39.

1.4 SUBMITTALS

- A. Product Data: Submit product information and mix design.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with Caltrans Standard Specifications, Section 39.
- B. Mixing Plant: Conform to Caltrans Standard Specifications, Section 39.
- C. Obtain materials from same source throughout.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Asphalt Cement: In accordance with Caltrans Standard Specifications, Section 39.
- B. Aggregate for Base Course Mix: In accordance with Caltrans Standard Specifications, Section 39.
- C. Aggregate for Wearing Course Mix: In accordance with Caltrans Standard Specifications, Section 39.
- D. Tack Coat: In accordance with Caltrans Standard Specifications.
- E. Slurry Seal: In accordance with Caltrans Standard Specifications, Section 37-3.
- F. Aggregate for Slurry Seal: In accordance with Caltrans Standard Specifications, Section 37-3.

2.2 ASPHALT PAVING MIX

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Base Course: In accordance with Caltrans Standard Specifications, Section 39.
- C. Wearing Course: In accordance with Caltrans Standard Specifications, Section 39.

2.3 SOURCE QUALITY CONTROL AND TESTS

- A. Comply with requirements of Section 01 45 00 Quality Control.
- B. Submit proposed mix design of each class of mix for review prior to beginning of Work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify compacted subgrade subbase is dry and ready to support paving and imposed loads.
- C. Verify gradients and elevations of base are correct.
- D. Verify gutter drainage grilles and frames, manhole frames, and are installed in correct position and elevation.

3.2 SUBBASE

- A. Prepare subbase in accordance with Caltrans Standard Specifications, Section 39.

3.3 PREPARATION – SURFACE

- A. Clean surface free of dirt, water, and debris.
- B. Fill cracks greater than 1/8 inch.
- C. Correct areas of subgrade failure.

3.4 PREPARATION - PRIMER

- A. Apply primer in accordance with Caltrans Standard Specifications, Section 39.

3.5 PREPARATION - TACK COAT

- A. Apply tack coat in accordance with Caltrans Standard Specifications.

3.6 PLACING ASPHALT PAVEMENT - SINGLE COURSE

- A. Install Work in accordance with Caltrans Standard Specifications, Section 39.
- B. Place asphalt within twenty-four hours of applying primer or tack coat.
- C. Place asphalt wearing course as shown.
- D. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- E. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.7 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

- A. Place wearing course within twenty-four hours of placing and compacting binder course. When binder course is placed more than twenty-four hours before placing wearing course, clean surface and apply tack coat before placing wearing course.
- B. Compact each course by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- C. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.8 TOLERANCES

- A. Section 01 45 00 Quality Control: Tolerances.
- B. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- C. Scheduled Compacted Thickness: Within 1/4 inch.
- D. Variation from Indicated Elevation: Within 1/2 inch.

3.9 FIELD QUALITY CONTROL

- A. Comply with requirements of Section 01 45 00 Quality Control.

3.10 PROTECTION OF FINISHED WORK

- A. Immediately after placement, protect pavement from mechanical injury for 48 hours or until surface temperature is less than 140 degrees F.
- B. Comply with requirements of Section 01 77 00 Contract Closeout and Final Cleaning.

END OF SECTION 32 12 16

SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes site concrete, including but not limited to pavements, walls, footings and sub slabs.
- B. Provide all labor, materials, equipment, and services to complete the work as indicated on the drawings, and in accordance with these specifications. Work includes but is not limited to the following:
 - 1. Concrete formwork
 - 2. Concrete reinforcement
 - 3. Cast-in-place concrete items:
 - a. Concrete paving, sidewalks, ramps, pads, curbs, mow bands, etc.
 - b. Miscellaneous concrete.
 - c. All imbeds including anchor bolts, tiedowns, hold downs with bolts, straps, and sleeves.
- C. Related Sections
 - 1. Section 32 84 00 Planting Irrigation

1.2 REFERENCES

- A. Caltrans Standard Specifications - Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation (Caltrans), latest edition.
- B. ASTM - American Society for Testing and Materials
- C. ACI - American Concrete Institute, Manual of Concrete Practice.
- D. CBC – California Building Code

1.3 DEFINITIONS

- A. Percent Compaction: ASTM D1557, percentage as shown on the Drawings of the maximum in-place dry density of the same material.

1.4 SUBMITTALS

- A. Conform to the requirements of Section 01 33 00 Submittals.
- B. Shop Drawings Reinforcement: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.
- C. Concrete Design Mixes:

1. The preparation of design mixes will be the responsibility of the Contractor. Mix designs may be prepared by the supplier and shall be certified by a Civil Engineer registered in California. Mix designs will be designed by the supplier and approved by the College's Representative.
 2. Written reports will be submitted to the College Representative of each proposed mix for review. Do not begin concrete production until mixes have been reviewed by the College's Representative.
 3. Adjustment of Concrete Mixes:
 4. Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results and other circumstances warrant; at no additional cost to the College and as accepted by the College's Representative. Provide submittals as in A above. Submit adjustment designs a minimum of 48 hours ahead of schedule for concrete production.
- D. Product Data: Manufacturers' current catalog cuts and specifications for the following:
1. Expansion joint filler, sealant, backer rod and bond breaker, including manufacturer's standard color chart for sealant
 2. Air-entrainment.
 3. Curing Compound.
 4. Fly Ash or Slag
 5. MDO plywood made for forming
- E. Samples:
1. MDO plywood made for forming, one 6"x 6" piece
- F. Certificates:
1. Reinforcing Steel: Certificate of compliance
 2. Concrete Mix Design: Ticket for each batch delivered showing the following:
 - a. Mix identification.
 - b. Weight of cement, aggregate, water, and admixtures, aggregate sizes/proportion, and air entrainment.

1.5 QUALITY ASSURANCE

- A. Comply with American Society for Testing Materials (ASTM) A-615 "Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," and "Manual of Standard Practice for Detailing Reinforced Concrete Structures," publication American Concrete Institute (ACI) 315-65 of the American Concrete Institute.
- B. Comply with all pertinent recommendations contained in ACI, "Recommended Practice of Concrete Formwork, ACI-347", and Section 2606, 1997 California Building Code (CBC).
- C. Construct forms to sizes, shapes, lines and dimensions indicated on Drawings, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in Work. Use selected materials to obtain required finish. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

- D. Provide complete forms of such strength and construction as to prevent any spread, shifting, or settling when concrete is deposited, and tight enough to avoid any leakage or washing out of cement mortar.
- E. Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly trained and experienced in placing the types of concrete specified and who shall direct all Work performed under this Section. For finishing of exposed surfaces of the concrete, use only thoroughly trained and experienced journeymen concrete finishers.
- F. Conform to Section 90 of the Caltrans Standard Specifications.
- G. The Contractor shall contact College's Representative of any discrepancies between field conditions and plans prior to proceeding with Work. The written dimension on Drawings shall supersede the graphic presentation. Dimensions are from back of curb, center line, base lines or as noted on the plans. All field adjustments must be approved by College's Representative prior to installation.
- H. All walks and curbs shall be established in the field for review and approval prior to concrete pours. The Contractor shall layout the area or form work for review by College's Representative. If approval is not obtained, the Contractor is responsible for removal of any unauthorized field adjustments.
- I. Transitions of curves to other curves, and curves to straight line tangents, shall be smooth and continuous.
- J. Place expansion joint and score joints as shown on plan. Adjustments in the field shall be made only with the approval of College's Representative.
- K. Where new concrete paving is placed adjacent to curbs or existing concrete paving, a construction joint (cold joint) shall be provided between the new concrete paving and curbs or existing concrete paving.
- L. Sleeving shall be coordinated with concrete work. Refer to irrigation plan for sleeving location.
- M. The Contractor shall be responsible for repairing, at no additional cost to College, any disturbed existing landscape designated to remain which resulted from construction of this project.
- N. Some materials may require a several week order lead time. Contractor is responsible for determining any and all ordering lead times, and providing required materials at the project site in a timely manner. No unapproved substitutions will be allowed. Contact College's Representative immediately if a specified material is not available.
- O. Mock-up:
 - 1. One 4 foot square mock up for all poured in place finishes, including concrete paving and vertical walls, as shown on the drawings. Mock-ups shall also include finish, jointing, thickness, and edging.
 - 2. Mock-ups shall be reviewed and approved by the College's Representative prior to commencing full work. Approved mock-up shall serve as a standard of quality for judging the acceptance of paving on the Project and may remain as part of the work.
- P. Lines and Levels: To be established by a licensed Surveyor or registered Civil Engineer.
- Q. Mix Standards: Conform to the ACI Manual and the Portland Cement Association's "Design and Control of Concrete Mixes".

R. Design of Concrete Mix: Employ approved commercial testing laboratory to design concrete mixes as follows:

Item	Minimum Cement Content *	28-Day Minimum Strength	Slump ± 1"	Maximum Aggregate Size	Maximum Water to Cement Ratio (By Weight)
Site Foundations (light poles, equipment pads, mow strips)	470 lb/cu. yd	2,500 PSI	6 in.	1 in	0.60
Sidewalks, Curbs, Gutters	517 lb/cu. yd.	3,000 PSI	4 in.	3/4 in	0.55
Structure Foundations	517 lb/cu. yd.	3,000 PSI	4 in.	3/4 in	0.60
Paving, Slab on Grade	564 lb/cu. yd.	3,500 PSI	4 in.	3/4 in	0.45
Walls	564 lb/cu. yd.	3,500 PSI	4 in.	3/4 in	0.45

*Up to 15% of cement may be substituted with Fly Ash per ASTM A618.

S. Fly Ash:

1. Source Control: The following sources of ash are not to be used:
 - a. Ash from a peaking plant instead of a base loaded plant.
 - b. Ash from plants burning different coals or blends of coal.
 - c. Ash from plants burning other fuels (wood chips, tires, trash) blended with coal.
 - d. Ash from plants using oil as a supplementary fuel.
 - e. Ash from plants using precipitator additives, such as ammonia.
 - f. Ash from start-up or shut-down phases of operation.
 - g. Ash from plants not operating at a "steady state."
 - h. Ash that is handled and stored using a wet system.
2. Fly ash used in concrete should be as consistent and uniform as possible. Fly ash to be used in concrete should be monitored by a quality assurance/quality control (QA/QC) program that complies with the recommended procedures in ASTM C311.(6) These procedures establish standards for methods of sampling and frequency of performing tests for fineness, loss on ignition (LOI), specific gravity, and pozzolanic activity such that the consistency of a fly ash source can be certified.

1.6 QUALIFICATION OF INSTALLER

- A. Installer shall be thoroughly trained and experienced in the skills required, and shall be completely familiar with the products and their installation as specified on the Drawings and in

this Section. Installer shall be present at all times during progress of Work of this Section and shall direct all Work performed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivered Mixes: Coordinate delivery so that mixes may be immediately poured upon arrival at site.
- B. Components and Accessories:
 - 1. Fittings and Reinforcements: Protect from rust, soil and oil contamination at all times. Store on pallets above ground.
 - 2. Templates: Protect from damage. Test accuracy prior to each use.

1.8 SEQUENCING AND SCHEDULING

- A. Coordination: Coordinate all items of other trades to be furnished and set in place. Coordinate proper installation of all accessories embedded in the concrete and for the provision of holes, openings, etc., necessary to the execution of the work of the trades in ample time that progress of the work is not delayed.

1.9 JOB CONDITIONS

- A. Cold-Weather Placement: comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- B. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.
- C. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 - 3. Fog spray form, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.

1.10 COORDINATION

- A. Secure all pipe sleeves, anchors and bolts, including those for angle frames, inserts, ties and other materials in connection with concrete construction, in position before concrete is placed.

- B. Obtain information and instructions from other Trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete so provisions for their work can be made without delaying the project.

1.11 FORM CONSTRUCTION TOLERANCES

- A. Set form to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of Work so that forms can remain in place for twenty-four hours after concrete placement.
- B. Check completed formwork for grade and alignment to following tolerances:
- C. Top of forms not more than one-eighth inch in ten feet vertical elevation.
- D. Vertical face on longitudinal axis not more than one-fourth inch in ten feet horizontal width.
- E. Circular or curved formwork shall be continuous, complete radii as indicated on Drawings. No straight segments in circular/curved formwork shall be accepted.

1.12 TESTS AND OBSERVATIONS

- A. The following tests shall be made by College's testing laboratory or by a certified Special Inspector as determined by the College. Special inspections for Concrete Construction shall be in accordance with Section 1704.4 and Table 1704.4 of the 2010 CBC and as noted below:
 - 1. Periodic Inspection of reinforcing steel and placement.
 - 2. Cement: Mill analysis and test reports by supplier certifying cement conforms to Specifications is acceptable in lieu of tests at the discretion of College's Representative.
 - 3. Provide free access to Work and cooperate with testing laboratory.
 - 4. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
 - 5. Concrete Inspections:
 - a. Continuous Placement Inspection: Inspect for proper installation procedures.
 - b. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
 - 6. Strength Test Samples:
 - a. Sampling Procedures: ASTM C172.
 - b. Cylinder Molding and Curing Procedures: ASTM C31, cylinder specimens.
 - 7. Concrete cylinders: Make and cure in accordance with ASTM C31.
 - a. Record shall be made of the time cylinders were made and of locations of concrete from which the cylinders were taken.
 - b. Three identical cylinders shall be taken from each pour of 25 cubic yards or part thereof, being placed each day.
 - c. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
 - d. Make one additional cylinder during cold weather concreting, and field cure.
 - 8. Field Testing:

- a. Slump Test Method: ASTM C143.
 - b. Air Content Test Method: ASTM C173.
 - c. Temperature Test Method: ASTM C1064.
 - d. Measure slump and temperature for each compressive strength concrete sample.
 - e. Measure air content in air entrained concrete for each compressive strength concrete sample.
9. Cylinder Compressive Strength Testing:
- a. Test Method: ASTM C39.
 - b. Test Acceptance: In accordance with ACI 318.
 - c. Test one cylinder at 7 days.
 - d. Test two cylinders at 28 days.
10. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.
11. Should tests show that concrete is below specified strength; the Contractor shall remove all such concrete. Full cost of removal of inferior concrete, its replacement with concrete of proper specified strength and testing shall be borne by the Contractor.

1.13 CODES AND STANDARDS

- A. ACI 301 "Structural Concrete for Building"
- B. ACE 305 "Recommended Practice for Hot Weather Concreting"
- C. ACI 306 "Recommended Practice for Cold Weather Concreting".
- D. ACI 308 "Curing Concrete"
- E. ACI 309 "Recommended Practice for Consolidation of Concrete"
- F. ACI 318 "Building Code Requirements for Reinforced Concrete".
- G. ACI 347 "Recommended Practice for Concrete Formwork".
- H. ACI 605 "Recommended Practice for Hot Weather Concreting".
- I. ACI 614 "Recommended Practice for Measuring, Mixing, and Placing Concrete".
- J. ASTM C31 "Practices for Making and Curing Concrete Test Specimens in the Field".
- K. ASTM C33-86 "Specifications for Concrete Aggregate".
- L. ASTM C94-89 "Specifications for Ready Mixed Concrete".
- M. ASTM C143 "Test Method for Slump Portland Cement Concrete".
- N. ASTM C150 "Portland Cement".
- O. ASTM C309 "Specifications for Liquid Membrane-forming Compounds for Curing Concrete".
- P. Western Concrete Reinforce Steel Institute (WCRSI) "Manual of Standard Practice".
- Q. Where provisions of pertinent codes and standards conflict with this Specification, the more stringent provisions shall govern.
- R. California Building Code (CBC), latest edition.

- S. Section 90 of the Caltrans Standard Specifications.

PART 2 - PRODUCTS

2.1 CONCRETE REINFORCEMENT

- A. Reinforcing Bars: Deformed Billet Steel Bars, ASTM A-615, Grade 40 or 60, containing a minimum of 70% total recycled content, clean and free from rust, scale, or coating that will reduce bond.
- B. Smooth Dowels for Joints: ASTM A615, Grade 40 smooth, billet-steel bars, shop painted with iron-oxide zinc-chromate primer.
- C. Welded Wire Mesh: ASTM A-185 plain type and uncoated finish.

2.2 CONCRETE

- A. Concrete Mix:
 - 1. Ready-mixed concrete in accordance with ASTM C-94 and with aggregates comply with ASTM C-33 and Portland Cement ASTM C-150, Type II.
 - 2. All mixes shall conform to applicable building code requirements listed herein or on the Drawings. All mix designs shall be submitted to the College's Representative for approval before being used. Mix design shall show proportions of cement, fine and coarse aggregate, and water and graduation of combined aggregates. Calcium chloride shall not be added at any mix.
 - 3. Concrete shall be Class B per Caltrans Standards.
 - 4. Cement: All cement shall be Portland cement Type II, and shall be the product of one manufacturer. The temperature of cement delivered to the plant shall not exceed 150 degrees Fahrenheit.
 - 5. Aggregates
 - a. Coarse aggregate shall have a minimum cleanliness value of 75.
 - b. Fine aggregate shall have a minimum of sand equivalent of 75.
 - c. Any suitable individual grading of coarse aggregates may be used.
 - 6. Water: All water shall be clean and free from deleterious matter.
 - 7. Admixture: No admixture of any type shall be used without prior approval of the College's Representative.
 - 8. Concrete shall be as specified: Class B
 - a. 28-Day Minimum Strength: Refer to Table in Paragraph 1.5(R) above
 - b. Concrete slump: Refer to Table in Paragraph 1.5(R) above
 - c. Air Content: No air entrainment
- B. Fly Ash: Pozzolanic admixtures, conforming to ASTM C618, Class C, with weight loss of ignition limited to not exceed 3 percent shall be used in mix designs to replace Portland Cement up to 15% by weight, unless noted otherwise on drawings.
 - 1. Reference: ACI 211.4R-93.

- C. Aggregate base for on-grade slabs:
 - 1. As specified in Section 32 11 23 Aggregate Base Courses
- D. Water: Clean, potable (domestic) free from injurious amounts of salts, oils, acids, alkalis, organic materials or other deleterious matter. Available from source determined by College's Representative.
- E. Air Entrainment: ASTM C260.
- F. Admixtures: Admixtures containing chlorides are not permitted. All admixtures shall be mixed in accordance with manufacture's written recommendations.

2.3 ACCESSORIES

- A. Tie Wires: Black annealed, ASTM A-82, minimum 16 gauge.
- B. Chains, Bolsters, Bar supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.
- C. Stirrup Steel: ASTM A-82.
- D. Snap Ties: Snap-off metal of fixed length capable of leaving no metal within one and one-half (1 1/2) inches of surface nor causing fractures, spall or other defects larger than one (1) inch in diameter.
- E. Expansion Joint Materials:
 - 1. Premolded Joint Filler: ASTM D1751, non-extruding and bituminous type resilient filler, compatible with sealant, and having a "guide strip" removable depth gauge.
 - 2. Joint Sealant: ASTM C290, non-slag sealant "Dynatred" by Pecora Corporation, [214] 278-8158 or "Sonolastic Sealant Two-Part" by Sonneborn, [415] 889-9899, or equal.
 - a. Color shall be selected by the College's Representative from the manufacturer's full color selection.
 - 3. Bond Breaker: Pressure-sensitive tape as recommended by sealant manufacturer to suit application.
- F. Forms:
 - 1. Steel or wood of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.
 - 2. Use forms that are straight and free of distortions and defects.
 - 3. Use flexible spring forms or laminated boards to form radius bends as required.
- G. Form Release Agent: Colorless non-staining, free from oils. Chemical agent shall not impair bonding of paint or other proposed coatings.
- H. Form-Facing Materials:
 - 1. All Surfaces: of sufficient strength to hold concrete properly in place and prevent leakage of water from forms.
 - 2. Exposed Surfaces: Matte finish, coated, medium density overlay plywood made for forming. No wood-textured finish will be permitted on exposed concrete unless specified as such.
- I. Wood Headers:

1. Wood: Construction Heart grade rough Redwood header and stake or pressure-treated rough Douglas Fir stake.
 2. Nails: Hot-dipped galvanized.
- J. Curing Compound: ASTM C309, Type I-D, Class A.
- K. Integral Color: as required for decorative finishes to match existing paving.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that subgrade preparation for concrete paving has been completed prior to commencement of work.
- B. Surface Drainage:
1. Report in writing conflicts discovered on the site or prior work, which would prevent positive drainage. Correct prior to performing concrete work.
 2. Do not permit finished paving surfaces to vary more than 1/4 in. measured with a 10 ft. metal straightedge, except at grade changes. No "birdbaths" or other surface irregularities will be permitted. Properly correct irregularities.

3.2 PREPARATION

- A. Templates: Use templates for all anchor plates, bolts, inserts and other items embedded in concrete. Accurately secure so that they will not be displaced during placing of concrete.
- B. Piping and Conduit: Do not embed piping, other than electrical conduit, in structural concrete. Locate conduit to maintain strength of structures at maximum. Verify size, length and location of electrical conduit.
- C. Aggregate Base Course: Compact base course to thicknesses and relative compaction shown on Drawings.

3.3 CONCRETE REINFORCEMENT PLACEMENT

- A. Fabricate reinforcement in accordance with ACI-315, providing a minimum concrete cover of three inches or as specified in UBC, latest edition.
- B. Place all reinforcement in the exact position shown on the Drawings and secure in position during the placing and compacting of concrete. Wire bars together with No.16 gauge wire with ties at all intersections except where spacing is less than twelve inches in each direction, in which case tie alternate intersections.
- C. Place all sleeves, inserts, anchors and embedded items required for adjoining work or for its support prior to concreting. Fill voids in embedded items temporarily with readily removable material to prevent entry of concrete.
- D. Give all contractors and subcontractors whose work is related to concrete or supported by it, ample notice and opportunity to introduce and/or furnish embedded items before concrete placement.
- E. Verify that concrete reinforcement may be installed in strict accordance with all pertinent codes and regulations, the Shop Drawings and the original design.
- F. Verify score joints in sidewalk slabs are constructed at 5-foot maximum intervals.

G. Bending:

1. Fabricate all reinforcement in strict accordance with the reviewed Shop Drawings.
2. Do not use bars with kinks or bends not indicated on the Drawings or on the reviewed Shop Drawings.
3. Do not bend or straighten steel in a manner that will injure the material.
4. Bend all bars cold.
5. Make all bends for other bars, including hooks, around a pin having diameter not less than six times the minimum thickness of the bar for number 8 and smaller and eight times the thickness for number 9 and larger.

H. Before the start of concrete placement, accurately place all concrete reinforcement, positively securing and supporting by concrete blocks, metal chairs or spacer, or by metal hangers.

I. Clearance:

1. Preserve clear space between bars of not less than one time the normal diameter of round bars.
2. In no case let the clear distance be less than 1 inch or less than 1-1/3 times the maximum size of aggregate.
3. Provide the following minimum concrete covering of reinforcement:
4. Concrete below ground deposited against forms: 3 inches.
5. Concrete deposited against earth: 3 inches.
6. Concrete elsewhere: as indicated on Drawings.

J. Splicing:

1. Horizontal bars:
2. Place bars in horizontal members with minimum laps at splices sufficient to develop the strength of the bars. Splice 40 bar diameters minimum.
3. Bars may be wired together at laps.
4. Wherever possible, stagger the splices of adjacent bars.
5. Wire fabric: Make all splices in wire fabric at least 1-1/2 meshes wide.
6. Other splices: Make only those other splices that are indicated on the approved Shop Drawings or specifically approved by College's Representative.

K. Dowels/Anchor Bolts: Place all required steel dowels/anchor bolts and securely anchor them into position before the concrete is placed. Bending the dowels after placement of concrete will not be permitted.

L. Obstruction: In the event conduits, piping, inserts, sleeves, or any other items interfere with placing reinforcement as indicated on the Drawings, or as otherwise required, immediately consult College's Representative and obtain review of new procedure before placing concrete.

3.4 CONCRETE FORMWORK CONSTRUCTION

- A. Construct support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete.

- B. Contractor assumes full responsibility in the removal of forms. The length of time forms must remain in place depends on the rate of time required for concrete to obtain a proper strength. Remove forms after the concrete is sufficiently hard to prevent damage to concrete.
- C. Circular or curved formwork shall be continuous, complete radii as indicated on Drawings. No straight segments in circular/curved formwork shall be accepted.
- D. Reuse of Forms:
 - 1. Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of surface.
 - 2. Thoroughly clean and properly coat forms before reuse.

3.5 INSTALLATION

- A. Notification: Notify the College's Representative at least 48 hours before placing concrete.
- B. Placing Concrete:
 - 1. Unless otherwise indicated or required by the Drawings, concrete paving shall be placed on compacted subgrade to thicknesses indicated on the Drawings to 95 percent compaction.
 - 2. Place concrete in accordance with ACI-304 and Section 2605 of the California Building Code. Immediately after depositing, compact concrete thoroughly by mechanical vibration. No vibrating of form is allowed. Mixing shall be continuous, with no interruptions from the time the truck is filled until the time it is emptied. Concrete shall be placed within one and a half hours from the time water is first added.
 - 3. Insure anchors, seats, plates, and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete.
 - 4. Insure reinforcement, inserts, embedded parts, etc. are not disturbed during concrete placement.
 - 5. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur, unless otherwise indicated on the Drawings.
 - 6. Lines and Grades: Elevations requiring accurate placement shall be set by a competent instrument man, using a professional type instrument.
 - 7. For all concrete placed on soil, the subgrade shall be wet and compacted prior to placing.
 - 8. Before placing concrete mixing, conveying and finishing equipment, forms and reinforcing shall be well-cleaned. Wet form before placing concrete, unless oiled forms are used.

3.6 CURING AND PROTECTION

- A. Beginning immediately after placement, protect concrete from premature drying, from excessively hot or cold temperatures, and from mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period necessary for hydration of cement and hardening of concrete. In hot, dry and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation – control material. Apply according to manufacturer's instruction.

- B. As soon as building flat work has hardened sufficiently to prevent injury to finish, apply an approved concrete curing agent in accordance with the manufacturer's recommendation.
- C. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than seven (7) days.
- D. Excessive cracking as determined by the College's Representative which is aesthetically unacceptable or which will result in premature disintegration of paving shall result in replacement of concrete.
- E. Removal of Forms: Remove no sooner than at seven days after each pour.
- F. Conform to all applicable requirements for curing and protection of concrete, Sections 90-7 and 90-8 of the Caltrans Standard Specifications.
- G. Spraying: Spray concrete during the curing period as frequently as drying conditions may require.
- H. Curing: Cure concrete in accordance with the ACI Manual of Concrete Practice. During curing period, maintain concrete above 70 degrees F. for at least 3 days or above 50 degrees F. for at least 5 days.
- I. Damage and Defacement: Protect all concrete work against damage and defacement during subsequent construction operations until final acceptance.

3.7 CLEANING AND PATCHING

- A. Removal: Remove all projecting fins, bolts, wire, nails, etc., not necessary for the work, or cut them back 1 in. from the surface and patch in an inconspicuous manner.
- B. Snap Ties: Immediately after removal of forms, cut off snap ties extending from the face of concrete to at least 1 in. deep in the concrete. Fill or plug as detailed in Drawings.
- C. Voids: Fill holes with a 1:3 cement/sand mortar with the same color as the adjoining concrete. Mix and place the mortar as dry as possible and finish flush with the adjacent surface.
- D. Corrective Patching: Correct all defects in concrete work. Chip all voids to a depth of at least 1 in. with the edges perpendicular to the surface and parallel to form markings. Fill all voids, surface irregularities, or honeycombing by patching or rubbing. Ensure that all concrete surfaces so repaired duplicate the appearance of the unpatched work.
- E. Finishing: Work finish surface texture as specified below.

3.8 FINISHES

- A. Light Broom Finish:
 - 1. Floating: Float surface once it has sufficiently stiffened. Check planeness of surface with a 10 ft. straightedge in all directions. Cut down high spots and fill lows. Immediately refloat to a uniform non-directional sandy texture.
 - 2. Obtain by drawing a stiff bristled broom across a floated finish.
 - 3. Direction of brooming to be perpendicular to direction of paving.
- B. Decorative Finish
 - 1. Match existing. Match shall be as determined by College's Representative.

3.9 JOINTS

- A. Construction Joints:
 - 1. Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.
 - 2. All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.
- B. Score Joints:
 - 1. Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.
 - 2. Score joints shall be formed in the fresh concrete using a jointer to cut the groove so that a smooth uniform impression is obtained. All joints shall be struck before and after sandblast.
 - 3. Locate and form joints with 1/4 inch radius edges and 1 inch to 1-1/4 inch deep score at the location as shown on the Drawings.
 - 4. All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.
- C. Expansion Joints:
 - 1. Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.
 - 2. Expansion joints shall be provided at the location and 40-foot maximum intervals as shown on the plans, and at all locations where concrete paving abuts buildings, curbs or other proposed or existing structures. Install as per detail on the Drawings.
 - 3. All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.
 - 4. Install backer-rod and joint sealant as indicated on the Drawings.
 - 5. Sealing of Expansion Joints: After the curing period, strip out all depth gauge strips and carefully clean expansion joints. Fill with joint compound as shown on Drawings. Avoid spilling compound on paved surfaces or overflowing from joint.
 - 6. Protect expansion joints from damage until placement of filler or caulk.

3.10 FIELD QUALITY CONTROL

- A. Samples: Contractor shall coordinate with the College to select a qualified testing laboratory to take samples for testing during the course of the work as described in Article 1.13 Tests and Observations.
- B. Field inspection and testing will be performed by a qualified testing laboratory in accordance with ACI 318 and as described in Article 1.13 Tests and Observations.
- C. Cost of Testing: Contractor shall be responsible for costs associated with testing.
- D. Rejected Materials: Remove off the site all concrete below specified strength.
- E. Cost of Removal and Retesting: Contractor shall be responsible for costs associated with removal and costs associated with retesting.
- F. Integral color: Color shall be evenly saturated in concrete mix to provide consistent, even, and distinct color in finished installation, including after medium sandblast finish is applied.

- G. Defective Work: Remove in its entirety and replace all defective concrete work which after corrective patching, rubbing, etc., fails to duplicate the appearance of unpatched work and/or conform to the standards set forth in these Specifications.
- H. Observe formwork continuously while concrete is being placed to see that there are no deviations from desired elevation, alignment, plumbness or camber.
- I. If during construction any weakness develops and falsework shows undue settlement or discoloration, stop work, remove affected construction if permanently damaged, and strengthen falsework.

END OF SECTION 32 13 13

SECTION 32 17 23
PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Section Includes painted pavement markings, lines, and legends.

B. Related Sections:

1. Section 32 12 16 Asphalt Paving

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. .
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Caltrans State Standard Specifications:
- D. Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS, latest edition
- E. M.U.T.C.D California Supplement, Latest Edition
- F. CBC - California Building Code, Latest Edition

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data on all coatings specified, including preparation and application instructions.
- B. Samples:
 1. Submit two paper chip samples, 3 inch by 5 in size illustrating range of colors and textures available for each surface finishing product scheduled.
 2. Submit two painted samples, illustrating selected colors and textures for each color and system selected. Submit on white card stock, 8 inch by 10 inch in size.
- C. Manufacturer's Installation Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, special surface preparation procedures, and substrate conditions requiring special attention.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALIFICATIONS

- A. Manufacturer Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.
- B. Applicator: Company regularly engaged and specializing in the application of pavement markings, with minimum three (3) years documented experience.

- C. Regulatory Requirements: Comply with applicable codes and regulations of cognizant governmental agencies having jurisdiction, including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provision.
- D. Volatile Organic Compounds (VOC): Use only products in compliance with VOC content limits required by state and local regulations.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions. Protect materials from adulteration by infiltration.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Perform the Work of this Section under environmental conditions no less stringent than those stipulated by the manufacturers of the materials used.
 - 1. Take precautions necessary to avoid and mitigate the effects of wind drift in the application of liquid materials.
 - 2. Do not apply marking paint when weather is foggy or rainy, or ambient temperatures are below 40 degrees F, nor when such conditions are anticipated during eight hours after application.
- B. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

1.7 EXTRA MATERIALS

- A. Supply 1 gallon of each color, type, and surface texture of paint installed. Store where directed.
- B. Label each container with color, type, texture, and room locations, in addition to manufacturer's label.

PART 2 - PRODUCTS

2.1 PAINTED PAVEMENT MARKINGS

- A. Manufacturers:
 - 1. Dunn-Edwards. Type: W801 Traffic Marking Paint
 - 2. ICI Dulux. Type: 4800 Series Traffic Paint
 - 3. Frazee Industries, Inc. Type: 506 Traffic Line Paint
 - 4. Or equal.
- B. Product Description: Dunn-Edwards Vin-L-Stripe Traffic Marking Paint, W801 Series, epoxy modified acrylic latex based, specifically formulated for application to asphalt and concrete vehicular traffic surfaces, or equal. Provide paint certifiable by the manufacturer as being in

accordance with the California Air Resources Board (CARB) rules in effect at the time of application.

1. Factory mixed, quick drying and non-bleeding.
2. Color
 - a. Text: White and Blue as shown on the Drawings.
 - b. Parking divider stripes: White.
 - c. No parking zone markings: Yellow.
 - d. No parking curb: Red.
 - e. Accessible Zone markings: White and Blue as shown on the Drawings.
 - f. Crosswalk striping: White.
 - g. Directional arrows: White.
 - h. Driving lane dividers: Yellow.
 - i. Designated bicycle lanes: Green, per the technical provisions of the FHWA's Interim Approval for Optional use of Green Colored Pavement for Bike Lanes: http://mutcd.fhwa.dot.gov/resources/interim_approval/ia14/ia14grnpmbiketlanes.pdf
- C. Blue paint for the symbol of accessibility: Match color No. 15090 in Federal Standard 595A as specified in Section 2-1720 of CCR Title 24 Handicap Regulations (similar to Royal Blue).

2.2 EQUIPMENT

- A. Pressurized, self-contained paint machine capable of applying a straight line from 2 inches to 6 inches wide, with consistent coverage of a minimum of 150 square feet per gallon.
- B. Machine Calibration:
 1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus 25 feet per mile.
 2. Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.
- C. Other Equipment
 1. For application of crosswalks, intersections stop lines, legends and other miscellaneous items by walk behind strippers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify surfaces are ready to receive Work as instructed by product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application to College's Representative.

3.2 PREPARATION

- A. Maintenance and Protection of Traffic:

1. Provide short term traffic control in accordance with these specifications.
 2. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.
 3. Maintain travel lanes at all times except when coordinated at least 3 working days in advance with College's Representative.
 4. Maintain access to existing buildings and other properties requiring access.
- B. Locate markings as shown on Drawings. Provide qualified technicians to supervise equipment and application of markings. Lay out markings using guidelines, templates and forms. Obtain verification from College's Representative for confirmation of lay out; colors, and placement of markings.
- C. Correct defects and clean surfaces affecting work of this section. Sand all gloss finishes to sheen. Remove existing coatings that are flaking or otherwise in unacceptable condition to receive paint Preparation or removal of coatings containing lead must be performed in accordance with all EPA and OSHA guidelines.
- D. Concrete and Masonry Surfaces: Pressure wash to remove all dirt, loose mortar, scale, salts, alkalies, and other detrimental substances. Remove oils and grease with solution of trisodium phosphate; rinse well and allow to dry. Remove all plant growth, including all growth spores and spore residue where designated.
- E. Asphalt Concrete: All surfaces must be cleaned free from grease, oil, dirt, mildew, stains and other contaminants that would cause adhesion problems. Remove loose, peeling or chalky paint by high-pressure washing or other appropriate methods. Surfaces must be completely dry before application.
1. Allow asphalt concrete to age for 30 days before starting pavement marking.

3.3 EXISTING WORK

- A. Remove existing markings in an acceptable manner. Do not remove existing pavement markings by painting over with blank paint Remove by methods that will cause least damage to pavement structure or pavement surface. Satisfactorily repair any pavement or surface damage caused by removal methods.
- B. Clean and repair existing remaining or reinstalled lines and legends.

3.4 APPLICATION

- A. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.
- B. Apply marking paint at rate of one gallon per 150 square feet (equivalent to approximately one gallon for 450 linear feet of 4 inch wide stripe). Rate can increase to a maximum of 400 square feet per gallon based on conditions of surface to be coated.
- C. Apply paint with mechanical equipment:
1. Provide uniform straight edges without overspray.
 2. Uniform line width of 4 inches, unless otherwise noted on the Drawings.
 3. Provide hatching in accessible parking areas as required by Code.
 4. Use single line striping between parking stalls.

5. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 13 mils.
 6. Identify parking spaces with text where shown on drawings.
- D. Accessibility Symbol: Apply international accessibility symbol on pavement surface in accordance with CCR Title 24 Section 1129B. The surface of each accessible parking space or stall shall have a surface identification duplicating the following scheme:
1. By outlining a profile view of a wheelchair with occupant in white on blue background. Locate profile view so that it is visible to a traffic enforcement office when vehicle is properly parked in the space. Size: 36 inches high by 36 inches wide.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Prior to applying, mix paint a sufficient length of time to thoroughly mix the pigment and vehicle together, and keep thoroughly agitated during its application.
- G. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- H. Apply markings to indicated dimensions at indicated locations.
- I. Prevent splattering and over spray when applying markings.
- J. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking and apply new markings.
- K. Collect and legally dispose of residues from painting operations.

3.5 INSTALLATION OF SPEED BUMPS

- A. Use epoxy, bitumen, or butyl pads to adhere speed bump to the ground.
1. Using epoxy or bitumen: Apply pre-mixed epoxy or bitumen to speed bump and fill inside cavity of base with epoxy or bitumen to remove any air pockets. Mount Unit to ground. Excess adhesive should ooze out and form a seal around the entire edge of the product.
 2. Using butyl pads: Remove tape from one side, place on the ground and step on paper side to adhere to surface. Remove other tape once pad has been adhered to ground and mount unit on the pad.
- B. On uneven surfaces, add additional adhesive to remove any air pockets caused by the irregular surface. Excess adhesive should ooze out and form a seal around the entire edge of the product.
- C. Using the speed bump as a template, mark the 2 holes to establish the pattern for drilling. Drill 2 holes 3 inches deep using a 3/8 inch bit. Clean holes.
- D. Using a small hammer, gently tap one 3 inch plastic or steel lag anchor into each hole. Place speed bump over the embedded anchors and check for proper alignment.
- E. Put a metal washer onto a 3/8 inch by 3-1/2 lag screw. Start lag screw through base hole into the anchor. Use a 3/4 inch wrench to tighten the each lag screw into speed bump.

3.6 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over the painted striping and pavement markers until the paint has cured.

3.7 APPLICATION TOLERANCES

- A. Maximum Variation from Wet Film Thickness: 1 mil.
- B. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
- C. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F.

3.8 PROTECTION OF FINISHED WORK

- A. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

END OF SECTION 32 17 23

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Chain link fence framework, fabric, and accessories.
- B. Manual gates: swing and sliding.
- C. Excavation for footings.
- D. Concrete footings
- E. Knox boxes

1.2 RELATED SECTIONS

- A. Section 10 41 00 - Emergency Access and Info. Cabinets (Knox Boxes)

1.3 REFERENCES (The latest/most current edition of each document listed below shall apply)

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- B. ASTM A153 / A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- C. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
- D. ASTM C94 / C94M - Standard Specification for Ready-Mixed Concrete
- E. ASTM F567 - Standard Practice for Installation of Chain-Link Fence
- F. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric
- G. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
- H. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- I. Chain Link Fence Manufacturers' Institute (CLFMI) - Product Manual.

<https://chainlinkinfo.org/wp-content/uploads/2017/05/CLFMI-Product-Manual-revised-March-2017-1.pdf>

1.4 SYSTEM DESCRIPTION

- A. See Drawings, Sheets A1.2.1 and A1.2.2 for configuration.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in commercial quality chain link fencing with five (5) years experience.
- B. Installation: Company with demonstrated experience installing specified products within 12 month period prior to contract award and in compliance with ANSI/ASTM F567.
 - 1) If any welding is required provide welders' certificates, verifying AWS qualification within the previous 12 months.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on shop drawings.

1.7 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorages, and schedule of components.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- D. Submit manufacturer's certificate of compliance with specified requirements.
- E. Submit samples of vinyl slats for color selection by Architect.

1.8 WARRANTY AND GUARANTEE

- A. Guarantee
 - 1. Provide guarantee under provisions of Section 01 77 19.
 - 2. Provide guarantee, for a period of three (3) years following final completion, against the following:
 - a. Corrosion of base material.
 - b. Fabric sagging, bowing, breakage or similar defects.
 - c. Fence framework failure, footing subsidence, or similar defects.
- B. Warranty: Provide manufacturers five (5) year warranty coverage.

- C. Warranty: Manufacture of slats to provide a 10 year warranty against color fading and breakage of slats.

PART 2 - PRODUCTS

2.1 FENCE FRAMEWORK

- A. General. Conform to CLFMI Product Manual
- B. Manufacturer: Provide a single manufacturer for all like products.
- C. Type: Steel pipe, Schedule 40, plain end pipe complying with ASTM F 1083.
- D. Finish: Hot Dipped galvanized per ASTM F 1083.
- E. Finish: PVC thermal fused coating over hot dipped galvanized per ASTM F1043.
- F. Size:
 - 1. Gate Posts:
 - f.
 - 2. Top, Bottom, Center and Brace Rail: 1.5 inches
Corner and Terminal Posts:
 - a. Fabric six to nine feet high: 3.5 inches
 - b. Fabric nine feet to twelve feet: 4.0 inches
 - b.
- B. Accessories:
 - 3. Tension Wire: ASTM A 824; 7 gage, Class 2 galvanized zinc coating.
 - 4. Tension bars: Steel, galvanized, 3/4 inch x 1/4 inch x full length.
 - 5. Tie Wire: 6 gage, galvanized, unless noted otherwise.
 - 6. Hog Rings: 9 gage, galvanized steel wire.
 - 7. Truss Rods: 3/8 inch diameter, with turnbuckle and hook or approved equal.
 - 8. Post Cap: cast iron or steel, configuration as required to provide weatherproof closure, hot dip galvanized, set screw retainer.
 - 9. Fittings: cast iron or steel, configuration as required for installation, hot dip galvanized.

1.2 FENCE FABRIC

- A. Manufacturer: Provide a single manufacturer for all like products.
- B. Type: Steel Wire Fabric, zinc coated, mesh woven. Top selvage twisted tight, bottom selvage knuckled end closed. Provide black vinyl coated fabric.
- C. Characteristics:
 - 3. Size: Two inch diamond mesh.
 - 4. Wire gage: No.9 -
 - 5. Edge: Knuckled selvedge at top and bottom of all fabric.
- D. Finish: Class 2 zinc coating.
- E. PVC thermal fused coating over hot dipped galvanized per ASTM F 668, Type 2b. Bonded or extruded and glued fabric not acceptable.
- F. Slat Infill: Austin Town Fence, Bottom Lock or equal, 1 3/32" wide slats, Sized for 2 inch mesh, at locations shown on drawings.
 - 1. Color: Gray
 - 2. Product Website Link:
<https://shop.afencecompany.com/Bottom-Lock-Slats-for-10-ft-high-fence-P2037.aspx>

1.3 GATES

- F. Frame: Steel pipe per Article 2.1 this Section, 2.0 inches.
- G. Fabric: Steel fabric per Article 2.2 this Section.
- H. Truss Rods: Per Article 2.1 this Section.
- I. Gate Fabrication:
 - 1. Gate frame: Welded frame, all welds ground smooth prior to galvanizing, hot dipped galvanized. Provide intermediate vertical bracing at gate leaves so that unsupported fabric width is eight (8) feet maximum.
 - 2. Hardware Fabrication: Spot weld hardware to frame and gate post.
- J. Transom Panel: Where gate is located in fence with top rail higher than gate panel, provide transom closure panel above gate.

1.4 GATE HARDWARE

Swinging Gate:

1. Provide minimum of three heavy duty hinges per leaf, 180 degree swing, with large clamping bearing surface. Hinge shall not allow gate to be lifted without removal of hinge.
2. At all gates, provide hold open and stop assembly that mechanically engages and holds gate in fully open position until manually released.
3. Gates serving vehicular access
 - b. Provide butterfly forked gravity drop bar with positive locking feature. Modify as required for padlock locking device. Mount at 30 inches minimum, 36 inches maximum above grade.
 - c. Double Leaf Gates: Provide center drop bar assembly, with minimum three forks equally spaced, configured to engage opposite gate leaf.
 - d. Provide lock keeper and ring assembly, requiring one padlock to lock both gates.
 - e. Provide steel heavy-duty track, ball bearing hanger sleeves and raceways, overhead framing and supports, guides, stays bracing, end stops, catches and access, with shaft welded to gate frame, as required, and all accessories as required for complete operable assembly.
 - f. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings, steel galvanized.
 - g. Provide drilled and welded tab on gate frame and gate post to receive padlock provided by Owner.
 - h. Provide Portland cement concrete footing for drop bar, with steel sleeve of sufficient length to provide minimum six inch embedment in concrete.

1.2 CONCRETE

- A. Provide concrete in accordance with Section 03 30 00 minimum 2,500 psi compressive strength at 28 days per ASTM C94/C94M. 3 inch slump, 1 inch max. sized course aggregate.

1.3 GROUT

- A. Atlas Ultimate HP Grout or equal, non shrink when tested in accordance with CRD-C-621 and ASTM C 827, providing minimum compressive strength of 2,500 psi at 24 hours and 8,000 psi at 28 days.
 - 1) Website Product Link:
 - 2) <https://www.atlasform.com/pages/Atlas%20Tech-Concrete%20Chemicals%20&%20Repair%20Materials/technical%20data%20sheet/atlas%20ultimate%20hp%20grout.pdf>

1.4 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 2 - EXECUTION

2.1 SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3. In the event of discrepancy, immediately notify the Architect.
 - 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

2.2 FOOTING PREPARATION AND INSTALLATION

- A. Install concrete foundations at all fencing posts.
 - 1. Corner, Gate and Terminal Posts:
 - a. See drawings for depth of footings.
- C. Install concrete grade beams and wheel guide footings at locations as shown on drawings.
- D. Where fencing is installed in curbs, slabs or walls, provide specified sleeves. Center post in sleeve and fill with non-shrink grout.

2.3 INSTALLATION

- A. General
 - 1. Install framework in accordance with ANSI/ASTM F567, at height indicated on drawings.
 - 2. Install framework following profile of finish grade, with maximum of 1 inch between bottom of fence edge or bottom rail and adjacent grade or paving. Do not install posts in ditches, dips or on mounds.
 - 3. Set terminal, gate and line posts plumb and aligned. Embed post to within 3 inches of bottom of footing. Slope top of concrete for water runoff.

4. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate post.
5. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
6. All field welding to be performed by certified welder and all welds are to be ground down smooth.
7. All clamping bolts protruding from clamp shall be cut off flush to nut and exposed end of bolt shall be galvalumed. Galvanized acorn nut is also an acceptable means of protecting students from sharp edges.

B. Line Posts

1. Space line posts at intervals not exceeding 10 feet, equidistant between break points.

C. Gate and Terminal Posts

1. Provide terminal posts at beginning and end of each continuous fence length, at changes in vertical and horizontal alignment of 15 degrees or more, and at intervals not exceeding 800 feet.
2. Brace each terminal and gate post back to adjacent line post with horizontal brace rail. Provide diagonal truss rod assembly from bottom of terminal post to line post/brace rail intersection.

D. Rails, Tension Wire and Truss Rods

1. Provide top rail through line post tops and splice with 7 inch long rail sleeves.
 - a. Provide center rail at mid height of fencing, as shown in drawings.
2. Provide tension wire, 2 inches above grade, stretched between terminal posts. Fasten at each line post.
3. Provide double truss rod assembly at all gates

E. Fabric

1. Allow concrete to attain sufficient strength prior to installing fabric.
2. Stretch fabric between terminal posts.
3. Position bottom of fabric approximately 1 inch above finished grade.
4. Where possible, place wire fasteners, clip ends and other fastening devices on fence side away from student path. Fasten fabric to top rail, line posts and bottom tension wire with tie wire at maximum 15 inches on centers.
5. Fasten fabric to rails, braces and line posts with wire ties maximum 12 inches on centers. Weave tie through fabric, around post and twist minimum three turns. Cut off wire ends.

6. Install bottom tension wire stretched taut between terminal posts.
7. Attach fabric to terminal posts and gate frames with tension bars and tension bar bands or clips, spaced maximum 12 inches on center. Extend tension bar full height of fabric.

F. Install bottom tension wire stretched taut between terminal posts.

G. Gates

1. Install in accordance with approved submittal.
2. Provide accurate alignment for use of specified locking devices.
3. Install without binding, permitting operation by a single individual.
4. Install center and bottom brace rail at corner gate leaves and all around enclosure.
5. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate post.
6. Do not swing gate from building wall; provide gate posts.
7. Install gate with fabric to match fence. Install three hinges per leaf, latch, catches, retainer and locking clamp.

H. Provide Knox boxes at posts or gates as shown on drawings.

2.4 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/8 inch.
- B. Maximum Offset From True Position: 3/8 inch.
- C. Components shall not infringe adjacent property lines.

END OF SECTION

SECTION 32 31 19

DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 SECTION INCLUDE

- A. Prefabricated Ornamental Fences and Gates

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 03 30 00 - Cast-In-Place Concrete.
- B. Section 08 71 00 - Door and Gate Hardware

1.3 REFERENCES

- A. ASTM A36 - Structural Steel.
- B. ASTM A53 - Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless.
- C. ASTM A123 - Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A283 – Low and Intermediate Tensile Strength Carbon Steel Plates.
- E. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- F. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- G. ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.
- H. AWS A2.0 - Standard Welding Symbols.
- I. AWS D1.1 - Structural Welding Code.
- J. SSPC - Steel Structures Painting Council.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01, General Requirements.
- B. Product Data: Provide data on fence material, finishes and attachment.
- C. Manufacturer's Installation Instructions: Submit criteria for preparation and application.

- D. Samples: Accompanying materials list, submit three samples of each fence type., showing panel connection to post. Grind and seal all edges.
- E. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- F. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- B. Staff:
 - 1. Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.
 - 2. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.
- C. Welders' Certificates: Submit under provisions of Division 01, General Requirements, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6 WARRANTY AND GUARANTEE

- A. Manufacturers Warranty:
 - 1. Provide, in Architect approved form, the Owner with manufacturers standard warranty against coating and fence system failure.
- B. Contractors Guarantee:
 - 1. Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:
 - a. Panel failure not resulting from anchorage and attachments.
 - b. Rusting and coating failure resulting from field installation.
 - c. Settlement and alignment resulting from footing embedment and earthwork failure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Division 01, General Requirements.

2.2 STEEL ORNAMENTAL FENCE SYSTEM

- A. Manufacturer: Ameristar Fence Products, Inc., www.ameristarfence.com
- B. Series: Montage II ATF Welded Ornamental Steel, Majestic, flush bottom rail treatment, 3-Rail style.
- C. Material:
 - 1. Fence Panels and posts: Steel, complying with ASTM A 653, with a minimum yield strength of 45,000 psi and a minimum zinc (hot-dip galvanized) coating weight of 0.90 oz/ft², Coating Designation G-90.
 - 2. Picket and rail assembly: Provide 1-inch square x 14 Gage tubing at pickets, with steel channel rails, 1.75 inch x 1.75 inch x 0.105 inch thickness. Picket holes in the rail shall be spaced 4.715 inches on center.
 - 3. Fence posts and gate posts: Provide posts complying with minimum size requirements of Table 1.

Table 1 – Minimum Sizes for Montage II Posts			
<u>Fence Posts</u>	<u>Panel Height</u>		
2-1/2-inch x 12 Ga.	Up to and Including 6-foot Height		
3-inch x 12 Ga.	Over 6 foot, Up to and Including 8 foot Height		
<u>Gate Leaf</u>	<u>Gate Height</u>		
	<u>Up to and Including 4 foot</u>	<u>Over 4 foot, Up to and Including 6 foot</u>	<u>Over 6 foot, Up to and Including 8 foot</u>
Up to 4 foot	2-1/2inch x 12 Gage.	3inch x 12 Gage.	3inch x 12 Gage.
4 foot 1 inch to 6 foot	3 inch x 12Gage.	4 inch x 11 Gage.	4 inch x 11 Gage.
6 foot 1 inch to 8 foot	3 inch x 12 Gage.	4 inch x 11 Gage.	6 inch x 3/16 inch
8 foot 1 inch to 10 foot	4 inch x 11 Gage.	6 inch x 3/16 inch	6 inch x 3/16 inch
10 foot 1 inch to 12 foot	4 inch x 11 Gage.	6 inch x 3/16 inch	6 inch x 3/16 inch
12 foot 1 inch to 14 foot	4 inch x 11 Gage.	6 inch x 3/16 inch	6 inch x 3/16 inch
14 foot 1 inch to 16 foot	6 inch x 3/16 inch	6 inch x 3/16 inch	6 inch x 3/16 inch

- D. Load capability: Comply with vertical load, horizontal load, and infill performance requirements for Industrial weight fences under ASTM F 2408.
- E. Fence and Gate Finish: Provide multi-stage zinc-phosphate pretreatment/wash, followed by a duplex application of epoxy primer and acrylic topcoat.
 - a. Coating Thickness: Minimum 2 mils (0.058 mm).
 - b. Color: Black
 - c. Performance: Comply with minimum coating performance criteria of ASTM F 2408.
- F. Fence Panel Fabrication:
 1. Pre-cut pickets, rails and posts cut to specified lengths. Pre-punch rails to accept pickets.
 2. Insert and accurately align pickets into the pre-punched holes.

3. Weld pickets and rails at each picket-to-rail intersection, producing seamless and spatter-free appearance.
4. Fit and shop assemble in each item in largest practical sections, for delivery to site.
5. Fabricate items with joints tightly fitted and secured.
6. Continuously seal joined members by continuous welds.
7. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
8. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
9. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
10. Fabricate radiused components by cold-rolled process, using equipment and techniques resulting in crimp free surfaces. Verify component wall thickness is suitable for rolling without flattening or crimping.
11. Remove all weld splatter, grind and sand all weld joints uniformly smooth, without visible scratches, gouges, or patch marks. Conform to Finish #2 of National Ornamental and Miscellaneous Metals Association "Joint Finish Guidelines."
12. All visible welds shall be continuous; bead or spot welding not acceptable.
13. Provide tube closures at all tube and pipe components.
14. Grind edges of all bent and fabricated components smooth to a ¼-inch radius.

2.3

2.3 GATE HARDWARE

- A. Refer to Section 08 71 00 for gate hardware type and schedule for gate hardware type and schedule.

2.4 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection

1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION OF ORNAMENTAL FENCE SYSTEM

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1.
- D. Fence Installation:
 1. Space posts in compliance with Table 3, plus or minus 1/2 inch, measured along the line/slope of the grade.
 2. Anchor panels to posts with manufacturer provided brackets.
 3. Set posts in concrete footings, minimum depth of 36 inches, in accordance with Section 03 30 10.

TABLE 3

Span	For CLASSIC, GENESIS, & MAJESTIC 8' Nominal (92-5/8" Rail)					
Post Size	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Industrial Universal	Industrial Universal	Industrial Flat Mount		Industrial Swivel	

	(BB302)	(BB303)	BB301)		BB304)*	
	96"	96-1/2"	96"	96-1/2"	*96"	*96-1/2"

E. Coating Repair

1. Seal penetrations of factory finish.
2. Remove all metal shavings from cut area
3. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole
4. Apply 2 coats of manufacturers custom finish paint matching fence color.

3.4 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 32 84 00
PLANTING IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY DESCRIPTION

A. Scope of Work

1. Provide irrigation systems as shown on the Drawings and described herein.

B. Related Work

1. Division 26 - Electrical: Power connection for controller.

1.2 SUBMITTALS

A. Material List

1. Complete manufacturer's technical data and installation instructions shall be submitted prior to performing any work. Material list shall include the manufacturer, model number and description of all materials and equipment to be used.

B. Record Drawings

1. The original record drawings shall be submitted to the College's Representative for approval prior to making the controller chart. Refer to Section 01 78 39 Record Documents.
2. Drawings shall include dimensions from two permanent points of reference such as building corners, sidewalks, or road intersections for the location of the following items:
 - a. Connection to existing water lines.
 - b. Connection to existing electrical power and splice locations.
 - c. Relocated existing equipment.
 - d. Gate valves.
 - e. Routing of sprinkler pressure lines.
 - f. Sprinkler locations
 - g. Sprinkler control valves.
 - h. Routing of control wiring.
 - i. Quick coupling valves.
 - j. Other related equipment as directed by the College's Representative.

C. Controller Charts

1. Controller charts shall be prepared by Contractor.
2. Provide one controller chart for each controller supplied.
3. The chart shall show the area controlled by the automatic controller and shall be the maximum size which the controller door will allow when rolled up.
4. The chart shall be a reduced drawing of the actual as-built system and shall be readable

when reduced.

5. The chart shall be a black line print and different colors shall be used to indicate the area of coverage for each station.
6. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 10 mils if required by College's Representative.
7. As-built record drawings and controller charts shall be completed and approved prior to final inspection of the irrigation system.

D. Operation and Maintenance Manuals

1. Contractor shall prepare Operation and Maintenance Manuals in accordance with Section 01 77 00 Contract Closeout and Final Cleaning.
 - a. Index sheet stating Contractor's address and telephone number, list of equipment with name and addresses of local manufacturer's representative.
 - b. Catalog and parts sheets on all major material and equipment items installed under this contract (not necessary for campus standard irrigation equipment).
 - c. Guarantee statement.
 - d. Complete operating and maintenance instructions on all major equipment.

E. Equipment to be Furnished

1. Furnish the following tools:
 - a. Two sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve provided on this project.
 - b. Two keys for each automatic controller.
 - c. Two quick coupler keys and matching hose swivel per project.
2. This equipment shall be furnished to College before final inspection can occur. Evidence that the College has received material must be provided to College's Representative.

1.3 QUALITY ASSURANCE

- A. Manufacturer's directions and detailed drawings shall be followed in all cases where points are not shown in the Drawings and Specifications.
- B. Drawings are generally diagrammatic and indicative of the work to be installed and do not show all offsets, fittings, sleeves, and other parts which may be required. Contractor shall carefully investigate the structural and finished conditions affecting all work and plan accordingly, furnishing such fittings, and other appurtenances as may be required to meet such conditions.. The Work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and architectural features.
- C. Before commencing irrigation system installation, Contractor shall resolve obstructions, grade differences or discrepancies in area dimensions that might not have been considered in engineering and shown on the Drawings.

1.4 COORDINATION AND SCHEDULING

- A. Contractor shall notify College's Representative in advance for the following observation meetings, according to the time indicated, and shall provide documentation to College's Representative that the following meetings occurred and their outcome.

1. Pre-job conference - 7 days.
2. Sleeve inspection – 48 hours.
3. Pressure supply line installation and testing - 48 hours.
4. Automatic controller installation - 48 hours.
5. Control wire installation - 48 hours.
6. Lateral line and sprinkler installation - 48 hours.
7. Flushing of lines – 48 hours.
8. Coverage test (prior to any planting installation) - 48 hours.
9. Final inspection - 7 days.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. PVC Pressure Main Line Pipe and Fittings

1. Pressure main line piping for sizes 4 inches and larger shall be C-900 with mechanical joints.
2. Pressure main line piping smaller than 4 inches inside sleeves, shall be PVC Schedule 40.
3. Pressure main line piping for sizes 3 inches and smaller shall be PVC Schedule 40 with solvent welded joints and with Schedule 80 fittings.
4. Pipe shall be made from NSF approved Type I, Grade I PVC compound conforming to ASTM resin specification D1785. All pipe shall meet requirements as set forth in Federal Specification PS-21-70.
5. PVC solvent-weld fittings shall be Schedule 40, 1-2, II-I NSF approved conforming to ASTM test procedure D2466.
6. Solvent cement and primer for PVC solvent-weld pipe and fittings shall be Christy's Red Hot Blue Glue, or equal.
7. All PVC pipe must bear the following markings and shall be visible upon installation.
 - a. Manufacturer's name.
 - b. Nominal pipe size.
 - c. Schedule or class.
 - d. Pressure rating in PSI.
 - e. NSF (National Sanitation Foundation) approval.
 - f. Date of extrusion.
8. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable Iron Pipe Size (IPS) schedule and NSF seal of approval.

B. PVC Non-Pressure Lateral Line Piping

1. Non-pressure buried lateral line piping shall be PVC schedule 40 with solvent-welded joints.

2. Pipe shall be made from NSF approved, Type I, Grade II PVC compound conforming to ASTM resin specification D1784. All pipe shall meet requirements set forth in Federal Specification PS-22-70 with an appropriate standard dimension ratio.
3. Except as noted above, all requirements for non-pressure lateral line pipe and fittings shall be the same as for solvent-weld pressure main line pipe and fittings as set forth in these specifications.
4. For all sprinkler head installations use Schedule 80 thread nipples and risers, and schedule 40 fittings.

C. PVC Sleeves:

1. PVC sleeves shall be Schedule 40 with solvent weld joints. Install sleeves at 24 inches depth to top of pipe. Backfill sleeve trench with sand. Depth exception may be considered at concrete walks with prior approval by College's Representative.

D. Brass Pipe and Fittings

1. Where indicated on the Drawings, use red brass threaded pipe.
2. Fittings shall be red brass conforming to Federal Specification #WW-P-460.

2.2 VALVES

A. Gate Valves

1. Gate valves 3 inches and larger shall be 125 lb. Static Water Pressure (SWP) bronze gate valve with screw-in bonnet, non-rising stem, solid wedge disc, threaded ends and a bronze or malleable iron handwheel. With a 2" operating nut.
2. Gate valves 2-1/2 inches and smaller shall be manufactured by Nibco, Aqua, Matco, or equal, 200 psi Water Oil Gas (WOG), 125 SWP, Screw-in bonnet, solid wedge.

B. Quick Coupling Valves

1. Quick coupling valves shall have a brass two-piece body designed for working pressure of 125 PSI operable with quick coupler.
2. Key size and type shall be as shown on Drawings.
3. Quick coupling valves shall be manufactured by Hunter (HQ44 – AW), Rainbird (44-LRC), Buckner (QB44) or equal.
4. All quick coupling valves without integral stabilizers shall be equipped with cast ductile iron anti-rotation devices or anchors that attached to the base of the valve and can be secured by a single bolt, and shall be manufactured by Leemco (LS-120, LS-150), Harco (82201, 82202) or equal .

C. Electrical Remote Control Valves

1. Electric control valves shall have a manual flow adjustment.
2. Provide one control valve box for each electric control valve.
3. Electric Remote Control Valves shall be manufactured by Hunter (ICV Series), Irritrol (Century Series), or equal.
4. Pressure regulating modules as required for pressure reduction on new or existing valves manufactured by, Hunter (Accu-Sync), Irritrol (Omni Reg), or equal, as noted on Drawings.

5. For pipe connections to valve bodies use Teflon tape material. Pipe dope shall not be used.

D. Associated Valves

1. Y-Strainer brass 80 mesh with brass gate valve to blow-out screen.
2. Above ground Y-strainers shall be metal.
3. Y-strainer shall be same size as water supply.
4. Gate valves 3 inches and smaller shall be brass.

E. Hydrometer

1. Hydrometer shall be compatible with the campus Rain Master central control system and must operate with controller - Netafim LHM2TG0085-MEL, normally open, with photo diode register. Install in concrete box with fiber lid after brass gate valve and Y-strainer at point of water connection. The hydrometer shall be sized to accommodate project flow rates and have the capacity to have additional systems added on in the future.

2.3 BACKFLOW PREVENTION UNITS

- A. Backflow prevention units shall be of size and type indicated on the Irrigation Drawings. Install backflow prevention units in accordance with irrigation details.
- B. Backflow prevention devices shall only be used on College domestic water lines. These devices shall not be installed on utility water lines.

2.4 WIRING

- A. Irrigation Control Wiring: Copper direct burial sprinkler wire, sized according to length of the run, minimum 14 gauge (white common, red primary lead, blue for spares). Run extra wires for future valves at the ends of all main line runs (see Drawings – 4 wires minimum).
- B. Electrical Dry Connection. Spears DS -400, pre-filled dri-splice connector with crimp sleeves; DRYCONN #10222 waterproof connectors by King Innovations (#22 to #12 AWG), or equal. Waterproof under-ground wire connections.
- C. Communication Cable: All communication wire for controllers and sensors shall be installed in electrical conduit not less than 1 inch.

2.5 AUTOMATIC CONTROLLERS

- A. Automatic controllers shall be Rain Bird ESP-LXD-LXMMSS-LXMMSSPED, Two-Wire Decoder Controller (50 Station), flow sensing, with exterior stainless-steel pedestal. No known equal. Controller shall fully communicate and integrate with College's existing system.
- B. Communications
 1. High gain antenna
 2. Provide one hand held Pro Max remote per controller.
 3. If there are more than 48 stations on a site, the controllers may be hard wired together with communication wire and do not need separate radios or antennas.
 4. Controllers shall not be placed within 15 feet of buildings that could cause radio interference.

2.6 MAIN LINE SHUT OFF BOX

- A. Install main line shut off valve at point of connection in a Christy concrete G5 traffic box for Main Line Shut Off Valves with “water” labeled lid, or equal.

2.7 CONTROL VALVE BOXES

- A. Use 10 by 10-1/4 inch round box for all gate valves, Carson Industries #910-12B with green bolt down cover, or equal. Extension sleeve shall be PVC- 6 inch minimum size.
- B. Use 9 1/2 by 16 by 11 inch rectangular box for all electrical control valves, Carson Industries 1419- 13B with green bolt down cover, or equal.

2.8 SPRINKLER HEADS

- A. All sprinkler heads on any one system (zone) shall be of the same size, type, and deliver the same rate of precipitation with the diameter (or radius) of throw, pressure, and discharge as shown on the Drawings and specified.
- B. Medium rotors shall be pop-ups with stainless steel risers and internal check valves, have a screw adjustment and shall be manufactured by Hunter (I-20-06-SS, I-20-12), or equal. Size per Drawings. Product used for basis of design is the Hunter I-20-12 with Standard Nozzles.
- C. Spray heads shall be manufactured by Hunter (PROS--06/12-CV-PRS30 with standard MPR nozzles unless otherwise noted), Rainbird (1812/1806/1804-PRS-SAM with standard MPR nozzles unless otherwise noted), or equal. Variable arc nozzles are to be used only when specifically approved by the College’s Representative.
- D. Double Swing Joint Assembly: These shall be fabricated in accordance with the detail. Use Schedule 80 PVC threaded nipples and risers and Schedule 40 fittings, see detail.
- E. Multi-stream bubbler heads shall be able to retract completely into Bubbler heads shall be Hunter MSBN, or equal.
- F. Riser nipples for all sprinkler heads shall be the same size as the riser opening in the sprinkler body.

2.9 LINE SOURCE SUB SURFACE DRIP IRRIGATION SYSTEMS (NOT USED)

2.10 DEEP ROOT WATERING TUBES

- A. Deep Watering Tube: 3” or 4” diameter semi-rigid polyethylene mesh tube (10 inch, 18 inch, 24 inch or 36 inch) with adjustable bubbler. Construct assembly as shown in details or use Hunter RZWS or equal, size per Drawings.

2.11 REMOTE CONTROL VALVE IDENTIFICATION TAGS

- A. 2-1/4 by 2-3/4 inch yellow polyurethane with valve number embossed on tag, as manufactured by Christy's Irrigation I.D. Tags, (714) 771-4142, or equal.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities which are caused by Contractor's operations or neglect. Check existing Utilities Drawings for existing utility locations.

- B. Refer to 1.4 Coordination and Scheduling for additional inspection requirements.

3.2 PREPARATION

A. Physical Layout

1. Prior to installation, Contractor shall stake out all pressure supply lines, routing and location of sprinkler heads, and layout of drip tubing.
2. All piping and tubing layout shall be approved by College's Representative prior to installation.

B. Water Supply

1. Point of Connection (POC): Install flow sensor and master valve assemblies after brass gate valve. The sizes of master valve and flow sensors to be main line-sized or larger for project and have the capacity to have additional systems added on in the future.
2. Electrical Supply
 - a. Electrical connections for automatic controller shall be made to electrical points of connection as indicated on the Drawings.

3.3 INSTALLATION

A. Trenching

1. Provide a minimum cover of 18 inches for all pressure supply lines.
2. Provide a minimum cover of 12 inches for all non-pressure pvc lines.
3. Provide a minimum cover of 4" for all drip tubing.
4. Provide a minimum cover of 18 inches for all control wiring.

B. Backfilling

1. No backfilling shall occur until College's Representative visually inspects and approves piping layout in trenches.
2. A fine granular material backfill shall be initially placed on all lines. No foreign matter larger than 1/2 inch in size will be permitted in the initial backfill. The trenches shall not be backfilled until all required tests are performed. Trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand, or other approved materials, free from 4 inch or greater clods of earth or 1/2 inch or greater stones, gravel or other debris. Backfill shall be mechanically compacted in landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill shall conform to adjacent grades without dips, sunken areas, humps or other surface irregularities.
3. Flooding of trenches will be permitted only with approval of the College's Representative.
4. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn or planting, or other construction are necessary, the Contractor shall make all required adjustments at no additional cost to the College.

C. Trenching and Backfill Under Paving

1. Trenches located under areas where paving (asphaltic concrete or concrete), will be installed shall be backfilled with sand (a layer 6 inches below the pipe and 3 inches above the pipe) and compacted in layers to 95 percent compaction, using manual or mechanical

tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in a firm condition, not prone to settling. All trenches shall be left flush with the adjoining grade. The Contractor shall set in place, as part of the sprinkler Work, cap and pressure test all piping under paving prior to the paving Work.

2. Piping under existing walks shall be done by jacking, boring or hydraulic driving where possible. Where any cutting or breaking of sidewalks or concrete is necessary permission shall be obtained from the College's Representative. No hydraulic driving will be permitted under concrete paving. Concrete paving shall be replaced back to nearest control joint. See Section 01 73 29 Cutting and Patching.
3. Provide for a minimum cover of 18 inches between the top of the pipe and the bottom of the aggregate base for all pressure and non-pressure piping installed under asphaltic concrete paving.

D. Pipe Assemblies

1. PVC pipe, drip tube, and fittings shall be thoroughly cleaned of dirt, dust and moisture before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.
2. On PVC to metal connections, Contractor shall work the metal connections first. Pipe tape shall be used on all threaded PVC to PVC, and on all threaded PVC to metal joints. Light wrench pressure is all that is required. Where threaded PVC connections are required, use threaded PVC adapters or machined PVC schedule 80 pipe nipples into which the pipe may be welded.
3. Do not install multiple assemblies in plastic sleeves.
4. Use fittings to change pipe directions. Do not deflect pipe beyond manufacturer's recommendations.
5. Do not install joints in sleeves or under pavement if length is less than 20 feet. Where pipe length exceeds 20 feet, use minimum number of joints.
6. Install PVC piping and fittings without tension on the fittings. Pipes should be inserted squarely and fully into socket of the fittings.

E. Pipe Clearance: All pipes shall have a minimum clearance of 6 inches from each other and from lines of other Work. Parallel pipes shall not be installed directly over one another. No more than two pipes may be installed in a single trench.

F. High Voltage Wiring for Automatic Controller

1. Provide 120 volt power connection to the automatic controller.

G. Remote Control Valves

1. Install where shown on Drawings and details. When grouped together, allow at least 12 inches between valve box edges. Install each remote control valve in a separate valve box.
2. Each controller and station number shall be labeled at the valve with a 2-1/4 by 2- 3/4 inch yellow polyurethane I.D. tag attached to the control wire of the valve.
3. Set valve boxes perpendicular to adjacent walls and parallel to one another.
4. Thoroughly flush mainline before installing valves.
5. Install valve and box to maintain a minimum of 1 inch clear space between the top of the

valve and the lid of the box.

6. Install valve box at the same level as soil grade, not above.

H. Control Wiring

1. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible.
2. Where more than 1 wire is placed in a trench, the wiring shall be taped together at intervals of 10 feet.
3. An expansion curl shall be provided within 3 feet of each wire connection. Expansion curl at electric control valves shall be of sufficient length so that in case of repair, the valve bonnet may be brought to the surface without disconnecting the control wires. Control wires shall be laid loosely in trench without stress or stretching of control wire conductors.
4. All splices shall be made with electric dry connections. Use one splice per connector.
5. Field splices between the automatic controller and electrical control valves will not be allowed without prior approval of College's Representative.

I. Flushing of System

1. After all new sprinkler pipe lines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of sprinkler heads, the control valves shall be opened and a full head of water used to flush out the system.
2. Sprinkler head nozzles shall be installed only after flushing of the system has been accomplished to the complete satisfaction of the College's Representative.
3. Flush drip systems before installation of flush and air relief valves, keep ends open.

3.4 EXISTING TREES

1. Where it is necessary to excavate adjacent to existing trees, the Contractor shall first discuss with the College Representative and get written permission for proposed trench route. Contractor shall use all possible care to avoid injury to trees and tree roots.

3.5 FIELD QUALITY CONTROL

A. Testing of Irrigation System

1. Contractor shall request the presence of the College's Representative in writing at least 48 hours in advance of testing. Testing of pressure mainlines shall occur prior to installation of electric control valves.
2. Test all pressure lines under hydrostatic pressure of 150 pounds per square inch, and prove watertight.
3. Sustain pressure in lines for not less than 2 hours. If leaks develop, replace joints and repeat test until entire system is proven watertight.
4. All hydrostatic tests shall be made in the presence of College's Representative. No pipe shall be backfilled until it has been inspected, tested and approved in writing, including laterals.
5. Furnish necessary force pump and all other test equipment.
6. When the sprinkler or drip irrigation system is completed, perform a coverage test in the presence of the College's Representative, to determine if the water coverage for planting

areas is complete and adequate. This test shall be accomplished before any plants are planted.

B. Adjustment of the System

1. Contractor shall flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings as much as possible.
2. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage Contractor shall make such adjustments prior to planting. Adjustments may also include changes in nozzle sizes and degrees of arc as required.
3. All sprinkler heads shall be set perpendicular to finished grades unless otherwise shown on the Drawings.

C. The entire sprinkler irrigation system shall be under full automatic operation for a period of 2 days prior to any planting. The College's Representative reserves the right to waive or shorten the operation period.

3.6 CLEAN-UP

A. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed or washed down.

3.7 FINAL OBSERVATION PRIOR TO ACCEPTANCE

- A. Contractor shall operate each system in its entirety for the College's Representative at time of final observation. Any items deemed not acceptable by the College's Representative shall be reworked to the complete satisfaction of the College's Representative.
- B. The controller must be set up and under full automatic operation before final inspection can occur and maintenance period can begin.
- C. Controller charts and final as-built record drawings shall be submitted in both electronic form and as 1 full-size hard copy. Both must be provided to the College's Representative and approved before final inspection can occur and maintenance period can begin. Refer to 1.2. B. and C.
- D. Contractor shall show evidence to the College's Representative that the College has received all accessories, charts, record drawings, and equipment as required before final inspection can occur.

END OF SECTION 32 84 00

SECTION 32 90 00
PLANTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope of Work: Provide landscape planting, complete in place, as shown and specified including; soil amendment and preparation, finish grading, planting, seeding, staking, header installation, clean-up, and maintenance.
- B. Related Sections:
 - 1. Section 31 22 19.13 Landscape Grading
 - 2. Section 32 84 00 Planting Irrigation

1.2 SUBMITTALS

- A. Submit documentation to College's Representative at least 30 days before planting certifying that all plant material is available, listing sources of materials.
- B. Submittals shall include but not be limited to the following:
 - 1. Fertilizer: Chemical and percentage composition.
 - 2. Mulch: Size, type of material.
 - 3. Amendments: Type, size and composition.
 - 4. Seed: Botanical and common name, percentage by weight, percentages of purity, germination and weed seed for each grass seed species.
 - 5. Planting schedule indicating anticipated dates for planting.
 - 6. Proposed maintenance work schedule.
- C. Quality Assurance Submittals:
 - 1. Plants shall be subject to inspection and approval by College's Representative at place of growth or upon delivery for conformity to specifications. Such approval shall not impair the right of inspection and rejection during progress of the work. The health and vigor of the plant material is the sole responsibility of Contractor. Submit written request for inspection of plant material at place of growth to College's Representative stating location and quantity of plants to be inspected.
- D. Plant substitutions requests shall be accompanied by a list of nurseries contacted in the search for the required plant. Requests shall also include sources of plants found that may be of smaller or larger size than specified or different cultivars. No substitutions may be made without approval of the College's Representative.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery
 - 1. Deliver fertilizer to site in unopened containers bearing manufacturer's guaranteed chemical analysis.
 - 2. Furnish College's Representative with copies of receipts for all amendments.

3. Deliver all plants with legible identification labels.
 - a. Label trees, shrubs, bundles of plants, or groundcover plants.
 - b. State correct plant name and size indicated on plant list.
 - c. Use durable waterproof labels with water-resistant ink which will remain legible for at least 60 days.
4. Protect plant material during delivery to prevent damage to root ball or desiccation of leaves.
5. Notify College's Representative 7 days in advance of delivery of all plant materials and submit an itemized list of the plants in each delivery.
6. Seed: Deliver seed in original sealed, labeled, and undamaged containers.
7. Ship and store seed, mulch and fertilizer with protection from weather or other conditions that would damage or impair the effectiveness of the product.

B. Storage

1. Store plant material in shade and protect from weather.
2. Maintain and protect plant material not to be planted within 4 hours in a healthy, vigorous condition.

C. Handling

1. Contractor is cautioned to exercise care in handling, loading, unloading and storing of plant materials. Plant materials that have been damaged in any way shall be discarded and shall be replaced with undamaged materials at the Contractor's expense.

1.4 COORDINATION AND SCHEDULING

- A. Perform planting only when weather and soil conditions are suitable in accordance with standards of industry.
- B. Scheduling: Install trees, shrubs, and liner stock plant material before wood mulch is spread.
- C. Observation Schedule. Contractor shall notify College's Representative in advance for the following site visits, according to the time indicated:
 1. Plant material review at growing site - notify College's Representative at least 30 days before planting.
 2. Pre-job conference - 7 days.
 3. Final grade review - 48 hours.
 4. Soil preparation.
 5. Plant material review - 48 hours.
 6. Planting operation and plant layout review - 48 hours. One tree with each type of specified staking shall be approved prior to planting of trees - 48 hours.
 7. Pre-maintenance - 7 days.
 8. Final acceptance - 7 days.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The following organic, soil amendments and fertilizer are based on typical campus soil composition and establish minimum requirements. Specific amendments and fertilizer amounts will be determined after rough grading operations are complete and soil samples are tested by the Contractor and approved by the College's Representative. The amounts listed in the Preparation section are considered minimum amounts for the project unless directed otherwise by the College Representative.
- B. All materials shall be of, approved and first-grade quality when installed and accepted. Any commercially processed or packaged material shall be delivered to the site in the original unopened container bearing the manufacturer's guaranteed analysis. Contractor shall supply College's Representative with a sample of all supplied materials accompanied by analytical data from an approved laboratory source illustrating compliance or bearing the manufacturer's guaranteed analysis.

2.2 HERBICIDES

- A. Non-selective, systemic contact herbicide install per manufacturer's specifications, Roundup, or equal.
- B. Pre-emergent herbicide (liquid or pelletized) install per manufacturer's specifications, Dow AgroSciences Dimension 2EW, or equal.

2.3 ORGANIC AMENDMENTS

- A. Organic amendment shall be nitrogen stabilized wood residual containing 0.56 to 0.84 percent N based on dry weight.
- B. Particle Size:
 - 1. 95 - 100 percent passing 6.35 mm standard sieve
 - 2. 80 - 100 percent passing 2.33 mm standard sieve
- C. Iron Content: Minimum 0.08 percent dilute acid soluble Fe on dry weight basis.
- D. Ash: 0-6.0 percent (dry weight).

2.4 COMPOST

- A. Blended and ground leaf, wood and other plant based material, composted for a minimum of 9 months and at temperatures sufficient to break down all woody fibers, seeds and leaf structures, free of toxic material.
- B. Compost shall be commercially prepared and meet US Compost Council STA/TMECC criteria.
- C. Shall comply with the following parameters:
 - 1. pH: 5.5 - 7
 - 2. Soil Salt (electrical conductivity): maximum 3 dS/m (mmhos/cm).
 - 3. Moisture content%, wet weight basis: 30-60.
 - 4. Particle size, dry weight basis: 98percent pass through 3/4 inch screen or smear.
 - 5. Stability carbon dioxide evolution rate: mg CO₂ -C/g OM/day<2.
 - 6. Solvita maturity test:> 6
 - 7. Physical contaminants, percent dry weight: <1percent.

8. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40 CFR & 503.13, Tables 1 and 3 levels.
9. Biological contaminants meet or exceed US EPA Class A standard 40 CFR & 503.32 (a) level requirements.

2.5 SOIL AMENDMENTS

- A. Soil Sulfur: Agricultural grade sulfur containing a minimum of 99 percent sulfur (expressed as elemental).
- B. Iron Sulfate: 20 percent Iron (expressed as metallic iron), derived from ferric and ferrous sulphate, 10 percent sulfur (expressed as elemental).
- C. Gypsum: Agricultural grade product containing 98 percent minimum calcium sulphate.

2.6 FERTILIZER

- A. Planting Fertilizer: Pelleted or granular form shall consist of the following percents by weight and shall be mixed by commercial fertilizer supplier:
 1. 16 percent nitrogen
 2. 6 percent phosphoric acid
 3. 8 percent potash
- B. Planting Tablets
 1. Shall be slow-released type with potential acidity of not more than 5 percent by weight containing the following percentages of nutrients by weight:
 - a. 20 percent nitrogen
 - b. 10 percent phosphoric acid
 - c. 5 percent potash
 - d. 2.6 percent combined calcium
 - e. 1.6 percent combined sulfur
 - f. 0.35 percent iron (elemental) from ferrous sulfate
 2. Shall be 21 gram tablets as manufactured by Agriform, Best Tabs, or equal, applied per manufacturer's instructions.
- C. Sulphate of Potash: 0-0-50.
- D. Single Super-phosphate: Commercial product containing 18-20 percent available phosphoric pentoxide
- E. Urea Formaldehyde: 38-0-0.

2.7 IMPORT TOP SOIL

- A. See Section 31 22 19.13, Landscape Grading.

2.8 PLANT MATERIAL

- A. Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules and rating. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free of insect infestations, weeds, plant diseases, sun

scalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and have well "hardened" systems and vigorous and fibrous root systems that are not root or pot-bound. Root conditions of the plants provided by Contractor in containers will be determined by removal of earth from the roots of not less than two plants or more than 2 percent of the total number of plants of each species or variety. Where container-grown plants are from several sources, the roots of not less than 2 plants of each species or variety from each source, will be inspected. In case the sample plants inspected are found to be defective, the College's Representative reserves the right to reject the entire lot or lots of plants represented by the defective samples.

- B. Trees shall have one central leader. If the leader was headed, a new leader (with a live terminal bud at least one-half the diameter of the pruning cut) shall be present. Trunk caliper and taper shall be sufficient so that the lower five feet of the trunk remains vertical without a stake. Temporary branches on the lower trunk of trees should be maintained unless greater than 3/8 inch diameter. Clear trunk should be no more than 50 percent of the total height of the tree. The attachment of major/scaffold branches shall be free of included bark. Each tree must include a minimum of three structural roots, reasonably distributed around the trunk (not clustered to one side). The root collar shall be within the upper two inches of the soil. The root system shall be reasonably free of stem girdling roots over the root collar or kinked roots from nursery production practices.
- C. The size of the plants shall correspond with that normally expected for species and variety of commercially available nursery stock or as shown on the Drawings. The minimum acceptable size of all plants measured before pruning with the branches in normal position, shall conform with the measurements, if any, shown on the Drawings. Plants larger in size than specified may be used with the approval of the College's Representative. If the use of larger plants is approved, the ball of earth or spread of roots for each plant shall be increased proportionately.
- D. All plants not conforming to the requirements herein specified, shall be considered defective and such plants, whether in place or not, shall be marked as rejected and immediately removed from the site of the Work and replaced with new plants at the Contractor's expense.
- E. Pruning: At no time shall trees or plant materials be pruned, trimmed or topped prior to delivery and any alteration of their shape shall be conducted only with the approval and when in the presence of the College's Representative.
- F. Plant material shall be true to botanical and common name and variety as specified in "Annotated Checklist of Woody Ornamental Plants in California, Oregon and Washington," published by the College of California School of Agriculture (1979).
- G. Nursery Grown Stock:
 - 1. Grown under climatic conditions similar to those in locality of project.
 - 2. Container-grown stock in vigorous, healthy condition, not root-bound or with root system hardened off.
 - 3. Use only liner stock plant material which is well established in removable containers or formed homogenous soil sections.

2.9 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated.

1. Seed Mix (at 50 lbs. per acre) shall consist of Lolium perenne SR4000 series perennial ryegrass.
- C. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, non-toxic, free of plant growth or germination inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- D. Non-asphaltic Tackifier; Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, non-toxic and free of plant growth or germination inhibitors.

2.10 STAKING MATERIALS

- A. Lodge pole tree stakes
 1. Provide 2 at each new planted tree as per detail.
 2. Round and uniform with chamfered top and conical point.
 3. 8 or 10 foot by 2 inches as required for height of tree
 4. Pressure Treated Douglas Fir
 5. Secure tree with tree ties.
- B. Tree Tie:
 1. ArborTie Tree Staking and Guying Material, or equal. Soft polypropylene with rounded weave and edge, 3/4" wide strap, break strength of 900 pounds.

2.11 WATER

- A. Provide or use only from College approved utility water source.

2.12 MULCH

- A. Shall be 100 percent shredded fir with an average particle size of 2 inches such as Walk On Bark, Redi Gro, Sacramento, or equal.
- B. In large or hard to access landscape areas pallet mulch may be used if approved by College's Representative - Nor Cal Blend, as supplied by Applied Landscape Materials, Rocklin, CA, or equal.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Obtain College Representative's written acceptance that planting soils have been cleaned of all construction debris, including gravel, concrete, concrete washout, paints, asphalt, etc. See Section 31 22 19.13 Landscape Grading.
- B. Obtain College Representative's written acceptance that final grades have been established to within 1/10 foot prior to commencing planting operations. Provide for inclusion of all amendments, settling, etc. Contractor shall be responsible for shaping all planting areas as indicated on Drawings.
- C. Prior to planting, inspect trees, shrubs and liner stock plant material for injury, insect infestation and trees and shrubs for improper pruning.
- D. Do not begin planting of trees until deficiencies are corrected or trees are replaced.

- E. All finish grading, soil preparation and irrigation work must be complete and accepted (included irrigation coverage test) prior to the installation of any plants.

3.2 PLANTING INSTALLATION

A. General

1. Only as many plants as can be planted and watered on that same day shall be distributed in a planting area.
2. Containers shall be opened and plants shall be removed in such a manner that the ball of earth surrounding the roots is not broken and they shall be planted and watered as herein specified immediately after removal from the containers. Containers shall not be opened prior to placing the plants in the planting area.

B. Pre-plant Weed Control

1. If live perennial weeds exist on site at the beginning of work, spray with a non-selective systemic contact herbicide, as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least 15 days to allow systemic kill. Clear and remove these existing weeds by mowing or grubbing off all plant parts at least 1/4 inch below the surface of the soil over the entire area to be planted.
2. After irrigation system is operational, apply water for 5 to 10 days as needed to achieve weed germination. Apply contact herbicides and wait as needed before planting. Repeat, if required by College's Representative.
3. Maintain site weed free until final acceptance by the College's Representative.

C. Soil Preparation

1. After approximate finished grades have been established, soil shall be conditioned and fertilized in the following manner. Amendments shall be uniformly spread and cultivated thoroughly by means of mechanical tiller into the top 12 inches of soil.
2. Application Rates: (Per 1,000 square feet): The following organic, soil amendments and fertilizer establish minimum requirements. Specific amendments and fertilizer amounts will be determined after rough grading operations are complete and soil samples are tested by the Contractor and approved by the College's Representative, see Section 31 22 19.13 Landscape Grading. The amounts listed below are considered minimum amounts for the project unless directed otherwise by the College Representative. Delivery tags for all specified amendments shall be provided to College's Representative prior to installation.
 - a. Nitrogen stabilized organic amendment or compost – 6 cubic yards for shrub beds, 3 cubic yards for lawn areas. Provide delivery tags to the College's Representative.
 - b. Planting fertilizer - 15 lbs.
 - c. Gypsum - 20 lbs.
 - d. Soil sulphur - 20 lbs.
 - e. Iron – 2 lbs.

- D. Layout of Major Plantings: Locations for plants and outlines of areas to be planted shall be marked on the ground by Contractor before any plant pits are dug. All such locations shall be approved by the College's Representative. If underground construction or a utility line is encountered in the excavation of planting areas, other locations for planting may be selected by

the College's Representative.

E. Planting of Trees and Shrubs:

1. Excavation for planting shall include the stripping and stacking of all acceptable topsoil encountered within the areas to be excavated for trenches, tree holes, plant pits and planting beds.
2. Excess soil generated from the planting holes and not used as backfill or in establishing the final grades shall be removed from the site.
3. Protect all areas from excessive compaction when trucking plants or other material to the planting site.
4. All excavated holes shall have vertical sides and shall be of a size that is three times the diameter and 1 and 1/2 times the depth of the root ball for all trees and shrubs. After pits are dug, roughen the sides of the pit and loosen soil in the bottom of the pit to a depth of 3 inches. Construct foot-tamped mound in the bottom of the pit to support the plant at the proper level.
5. All prepared tree pits must be reviewed and approved by the College's Representative prior to the planting of any trees.
6. Percolation tests are required for 1 out of every 5 trees planted, for and every bioswale or stormwater collection feature on a given site. Tree pits from each planting area of the project shall be tested for percolation. However, in areas where over-excavation of a building foundation has occurred, or any other construction practice typically resulting in extremely compacted subsoil conditions, all tree pits must be tested for percolation. Tree pits and bioswales shall be filled with water and the drainage rate observed. Percolation rate shall be a minimum of the depth of the tree pit or bioswale within 24 hours. If percolation/drainage rate is less than that - mitigation measures shall be implemented.
7. Do not handle container plants by the tops, stems or trunks at any time. Lift all plants so that the root ball is supported from the underside.
8. Plants that do not have a satisfactory root system may be rejected at the discretion of the College's representative. The outer surfaces of plants and trees shall be shaved to remove all circling, descending, and matted roots. Shaving shall be performed using saws, knives, sharp shovels or other equipment that is capable of making clean cuts on the roots. College's Representative must be contacted prior to root pruning all trees in order to coordinate observation of root pruning practices with the Campus Arborist. Modifications required to make the root system of plants and trees conform to plant quality standards shall not be considered as grounds to modify or void the plant warranty.
9. Center plant in pit or trench. Crown of trees shall be 1 inch minimum above finish grade. Crown of shrubs shall be 1 inch above finish grade.
10. Face plants with fullest growth into prevailing wind.
11. Set plant plumb and hold rigidly in position until soil has been tamped firmly around ball or roots.
12. Backfill for trees and shrubs shall consist of amended native soil. If native soil is unsuitable or contaminated, use imported topsoil as specified above.
13. All plants which settle deeper than the surrounding grade shall be raised to the correct level. After the plant has been placed, additional backfill shall be added to the hole to cover approximately 1/2 of the height of the root ball. At this stage, water shall be added

to the top of the partly filled hole to thoroughly saturate the root ball and adjacent soil.

14. Container Removal:

- a. Cut containers on 2 sides with a can cutter designed for the job.
- b. Do not injure root ball.
- c. Do not cut containers with spade or ax.
- d. After removing plant, superficially cut edge roots with knife on 3 sides.

15. Box Removal:

- a. Remove bottom of plant boxes before planting.
- b. Remove sides of box without damage to root ball after positioning plant and partially backfilling.

16. Plant Tablets:

- a. After the water has completely drained, planting tablets shall be placed as indicated below.
 - 1) Two tablets per 1-gallon container.
 - 2) Four tablets per 5-gallon container.
 - 3) Six tablets per 15-gallon container.
 - 4) Ten tablets per 24 inch box.
 - 5) Fourteen tablets per 36 inch box.
 - 6) Eighteen tablets per 48 inch and those box sizes which are larger.
- b. Planting tablets shall be set with each plant on top of the root ball while the plants are still in their containers so the required number of tablets to be used in each hole can be easily verified by the College's Representative.

17. Backfill

- a. The remainder of the hole shall then be backfilled with 2/3 native soil and 1/3 organic amendment thoroughly blended and tamped firm.
- b. After backfilling, an earthen basin shall be constructed around each plant. Each basin shall be of a depth sufficient to hold at least 2 inches of water. The basins shall be constructed of amended backfill materials. Remove basin in all turf areas after initial watering.

18. Pruning shall be limited to the minimum necessary to remove injured twigs and branches, and to shape the plant material as directed by the College's Representative. Pruning shall not be done prior to delivery of plants.

19. Staking: Staking of all trees shall be completed immediately after planting. All stakes shall be installed as indicated in Drawing details.

F. Mulch

1. All groundcover, perennial, and shrub beds shall be dressed with a 3 inch layer of mulch, where slopes are not steeper than 2:1.
2. Pre-emergent weed control product shall be applied to all planting areas after completion of planting and prior to mulch application. Use Dimension, or equal and apply per

manufacturer's recommendations.

G. Lawn

1. Hydroseeding

- a. Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
- b. Mix slurry with non-asphaltic tackifier.
- c. Apply slurry uniformly to all areas to be seeded in a one step process. Apply mulch at the minimum rate of 1500 pound per acre dry weight but not less than the rate required to obtain specified seed-sowing rate.
- d. Acceptance of all seeded areas will be based on growth of a uniform color and dense stand of grass, without bare spots of over 4 inches square. If grass is not established prior to the end of the maintenance period Contractor shall provide an additional hydroseed application and shall continue maintenance until seeded areas are accepted by the College's Representative.

3.3 CLEAN UP

- A. During the progress of the Work, the Contractor shall keep the Project site in a neat and clean condition that is free of debris to the satisfaction of the College's Representative. All materials and debris accumulated in conjunction with completing this Work shall be legally recycled or disposed of by Contractor off campus. Refer to Section 01 50 13 Construction Waste Management and Disposal. Remove all trash, excess soil, empty plant containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site.
- B. The Contractor shall leave the site area broom-clean and shall wash down all walkways and other paved areas, leaving the premises in a clean and safe condition.
- C. Promptly remove soil and debris created by hydroseed work from paved areas and building walls. Clean wheels of vehicles before leaving site to avoid tracking soils onto surfaces of roads, walks, or other paved areas.

3.4 MAINTENANCE & PLANT ESTABLISHMENT

- A. General: Maintain all plants and planting areas from time of delivery, through installation and maintenance period, until final acceptance.
- B. Schedule: Submit proposed maintenance work schedule to College's Representative in writing for review at least 30 days prior to commencement of maintenance work. Maintenance work shall be done at times accepted by College. Contractor's maintenance crew must be present at the project site at least once a week and as often as necessary to perform specified maintenance.
- C. Maintenance Procedures
 1. General: Maintenance of new planting includes but is not limited to watering, cultivating, fertilizing, weeding, mulching, re-staking, resetting plants to proper grades or upright positions, restoring watering basins, maintaining lawns, removal of dead flowers and broken twigs, pest, disease and weed control, erosion control, restoring finish grades with accepted and tested imported topsoil, and taking precautions as necessary to prevent sunscald damage. Remove nursery tags and repair mulch 10 days before final acceptance.

2. Young tree pruning shall be conducted during the maintenance period by the Contractor as approved by the College's Representative after review by the Campus Arborist and in accordance with the College's standard tree pruning practices. Trees shall be pruned to encourage the growth of strong central leaders where applicable. Contractor shall notify College's Representative 48 hours in advance of any pruning operations.
 3. Protection: Protect planting areas and plants against damage until final acceptance. Maintenance also includes temporary fences, barriers, and signs as required for protection. Treat or replace damaged plants as directed by College's Representative at no additional cost to College.
 4. Fertilization: Apply potassium sulfate and 16-6-8 fertilizer at the rate of 6 pounds each per 1000 square feet, 30 days after installation.
 5. Weed control:
 - a. Keep site free of weeds during maintenance period.
 - b. Identify weeds and apply accepted control methods.
 - c. Herbicides, if used, shall be applied by licensed Pest Control Operator according to manufacturer's recommendations.
- D. Observation for Maintenance Period Commencement: Request after work of this section and Section 32 84 00 Planting Irrigation is substantially complete. Maintenance Period shall begin upon written notice of acceptance by College's Representative and shall continue for a minimum of 60 days until final acceptance by College's Representative.

END OF SECTION 32 90 00

SECTION 33 05 13
MANHOLES AND STRUCTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Modular precast concrete manhole bases, sections with tongue-and-groove joints, covers, and accessories for sanitary sewer and storm drain systems. Section also includes cast in place manhole bases.

1.2 RELATED SECTIONS

- A. Section 01 45 00 Quality Control
- B. Section 31 00 00 Earthwork
- C. Section 31 23 33 Trenching and Backfilling

1.3 REFERENCES

- A. American Concrete Institute (ACI) 308 - Standard Specification for Curing Concrete
- B. ACI 318 - Building Code Requirements for Structural Concrete
- C. American Society for Testing and Materials (ASTM) A48/A48M - Standard Specification for Gray Iron Castings
- D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- E. ASTM C150 - Standard Specification for Portland Cement
- F. ASTM C443 REV A- Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- G. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections
- H. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile
- I. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
- J. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures
- K. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
- L. Corps of Engineers Specification No. CRD-C572 - Handbook for Concrete and Cement Corps of Engineers Specification for Polyvinylchloride Waterstop.
- M. The term "State Standard Specifications" is understood to refer to the Standard Specifications, State of California, Business, Transportation and Housing Agency, Department of Transportation (CALTRANS), May 2006 edition. In cases of conflict between the State Standard Specifications and these specifications, these specifications shall govern.
 - 1. Any provisions for measurement and payment specified within the State Standard Specifications shall be disregarded and the provisions of this contract shall govern.

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Submit product technical data acknowledging that products meet requirements of standards referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
- D. Laboratory Testing: Submit results of laboratory compression testing on precast concrete.

PART 2 - PRODUCTS

2.1 MANHOLE SECTIONS, BASES, RISERS AND TOPS

- A. Concrete: State Standard Specifications, CALTRANS Section 90-10, Minor Concrete, conforming to ACI 308, ACI 318, and ASTM C150.
- B. Manhole sections, bases, risers and tops: Precast reinforced concrete per ASTM C478, with resilient connectors per ASTM C923.
- C. Provide precast reinforced manholes, frame and cover as indicated on Drawings and as detailed. Inside dimensions, depth, clear lid opening, and pipe penetrations shall be as indicated on the Drawings. Cone section shall be eccentric.
- D. Cast-in-place concrete bases may be used as an alternative to a precast concrete bases. Concrete shall conform to CALTRANS Section 90 and shall be Class "A" containing six packs of Portland Cement per cubic yard of concrete with a minimum design compressive strength of 3,000 psi after 28-days. Reinforcing bars shall be of intermediate grade billet steel conforming to ASTM A615 and shall be the size shown on the Drawings. Provide waterstop for cast-in-place bases in accordance with manufacturer's instruction. PVC waterstops shall be manufactured from virgin polyvinyl chloride conforming to the Corps of Engineers Specification No. CRD-C572.
- E. For pipe penetrations through manholes, core through, install gasket around pipe, grout penetration on both sides and install a minimum of 6 inches (thickness and distance) around collar outside of the manhole or inlet structure penetration. Connections shall be A-lok for ductile iron pipe, Kor-n-seal for PVC pipe, or equal.

2.2 MANHOLE FRAME AND COVER

- A. Frame and Cover: Cast iron per ASTM A48 Class 35B and conforming to Section 55-2.03 and 75-1.02 of the CALTRANS Standard Specifications. Manhole frame and cover shall be D&L Supply A-1024, South Bay Foundry SBF 1900 CPH, or equal.
- B. Provide Frame and Cover as detailed and shall be H-20 traffic rated.

2.3 MANHOLE SEALANT GASKETS

- A. Precast reinforced concrete sewer manhole sections shall be joined with rubber gaskets conforming to ASTM C443. Sealant gaskets shall be Ram-Nek, Kent Seal, or equal. Use of mortar will not be allowed.

2.4 STORM DRAIN PUMP

- A. Install simplex submersible pump, and electrical connections, per Plan. Provide necessary equipment to lift the new pipe discharge into the existing pipe, including rails, lifting cable, and control panel, including all connections, electrical or otherwise.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation of manhole structures shall conform to ASTM C478 and ASTM C891.
- B. Excavation and backfill for manholes shall conform to the applicable provisions of Section 31 20 00, Earth Moving and Section 31 23 33, Trenching and Backfilling.
- C. Place concrete base pad, trowel top surface level. Set precast manhole base unit level on the base material or concrete work slab as specified herein for a cast-in-place base.
- D. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad. Place manhole cylinder plumb and level, to correct dimensions and elevations.
- E. Cut and fit for pipe.
- F. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
- G. Set cover frames and cover level without tipping, to correct elevations.
- H. Installation shall comply with Storm Water Pollution Prevention Plan requirements.

3.2 TESTING

- A. Precast, reinforced, concrete manhole bases, risers and tops shall be tested in accordance with ASTM C497 by an approved testing laboratory, for concrete compression tests on cores drilled from 5 percent of the lot.
- B. When the groundwater table is too low to permit visual detection of leaks, 20 percent of the total of all manholes shall be hydrostatically tested. The test shall consist of plugging all inlets and outlets and filling the manhole with water to a height determined by the College's Representative. Leakage in each manhole shall not exceed 0.2 gallon per hour per foot of head above the invert over a period of 30 minutes. A manhole may be filled 24 hours prior to time of testing, if desired, to permit normal absorption into the pipe walls to take place. Repair all manholes that do not meet the leakage test, or are unsatisfactory from visual inspection, to conform to the requirements herein, at no additional cost to the College. If more than 25 percent of the manholes tested fail the hydrostatic test, the Contractor will be required to test all or as many manholes as the College's Representative may deem necessary.
- C. Manhole vacuum testing per ASTM C1244 will be acceptable as an alternative to hydrostatic testing. A minimum of 9 inches of mercury shall be held for a minimum time of one minute.
- D. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.
- E. Precast, reinforced, concrete manhole bases, risers and covers shall be subject to rejection for failure to conform to any of the Specification requirements. In addition, individual sections of manhole risers and covers may be rejected for any of the following reasons:
 - 1. Fracture or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
 - 2. Defects that indicate imperfect proportioning, mixing, or molding.

3. Surface defects indicating honeycombed or open texture.
4. Damaged ends, where such damage would prevent making a satisfactory joint as determined by the College's Representative.
5. The internal diameter of the manhole section varying more than 1 percent from the nominal diameter.
6. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of 12 inches or more, regardless of the position in the section wall.

END OF SECTION 33 05 13

SECTION 33 05 26
UTILITY LINE SIGNS, MARKERS, AND FLAGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Utility line signs, markers, and flags for underground utilities.

1.2 RELATED SECTIONS

- A. Section 01 45 00 Quality Control

1.3 REFERENCES

- A. American Society of Mechanical Engineers (ASME) A13.1 - Scheme for the Identification of Piping Systems

1.4 SUBMITTALS

- A. See Section 01 33 00 for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

PART 2 - PRODUCTS

2.1 PLASTIC LINE MARKER

- A. Detectable warning tape shall be provided for all underground utilities. Underground-type conductive line markers shall conform to ASME A13.1 and be permanent, brightly colored, continuous-printed plastic tape, intended for direct burial service; not less than 6 inches wide by 4 mils thick. Provide color coding appropriate with utility with "CAUTION _____ (insert applicable utility) LINE BURIED BELOW" in large black letters. Plastic line markers and tracer tape shall be Presco, Emed Co. Inc., or equal.
- B. For newly installed telecom conduits, the ends of the detectable warning tape shall be accessible inside the telecom hand holes for attachment to electronic locating equipment.

2.2 TRACER WIRE

- A. All underground telecom conduits, chilled water piping, domestic water piping, utility water piping, non-metallic gas piping, pressurized sanitary sewer piping, and storm drain piping shall be accompanied by a tracer wire. Tracer wire shall be solid core #10 copper wire with a thermoplastic insulation recommended for direct burial.
- B. For newly installed telecom conduits, the ends of the #10 copper wire shall be accessible inside the telecom hand holes for attachment to electronic locating equipment.

- C. Wire Connectors: Wire connections shall be made with 3M DBR-6, a properly sized split bolt connector or equal. The connection shall be watertight and provide electrical continuity. 3M Scotchkote Electrical Coating, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Utility piping markers and tracers shall be installed in accordance with the manufacturer's instructions. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.
- B. Plastic coding tape shall be installed directly over the pipe, 18 to 24 inches above the top of the pipe.
- C. Tracer wire shall be fastened to the top of the pipe so as not to be displaced or broken during backfilling, such as by affixing the wire to the pipe with duct tape at approximately 10-foot intervals.
- D. Both ends of tracer wire shall be accessible at all utility valve boxes and locator boxes and shall be terminated on the top of the valve or locator box as detailed.
- E. For directional drilling, auguring or boring installations, a minimum of two #10 tracer wires shall be installed with the pipe and connected to the tracer wire at both ends to ensure at least one wire is useable.
- F. When connecting tracer wire with 3M DBR-6 Direct Bury Splice Kit, install per manufactures instructions. When connecting tracer wire with a split bolt connector, wrap the connection with vinyl electrical tape then apply 3M Scotchkote Electrical Coating evenly over splice, extending a short distance onto the cable insulation. Repeat application to provide two layers of tape and coating.

3.2 TESTING

- A. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.
- B. Contractor shall perform continuity testing on all trace wire in the presence of the College's Representative.

3.3 REPAIR/RESTORATION

- A. If the trace wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire.

END OF SECTION 33 05 26

SECTION 33 08 00
COMMISSIONING OF UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Commission all systems and equipment listed in the table below per the requirements of Section 01 91 00 Commissioning. The Installation/Start-up Verification (ISV) and Functional Performance Test (FPT) forms listed are required and will be provided by the College. Refer to the project website for standard commissioning forms.

Equipment/System	ISV Form	FPT Form
Site HVAC and Plumbing Utilities	ISV-33 00 00	N/A

1.2 RELATED WORK AND DOCUMENTS

- A. Section 01 91 00 Commissioning
B. Division 33 Utilities

1.3 COMMISSIONING DEFINITIONS AND ABBREVIATIONS

- A. Refer to Section 01 91 00 Commissioning

1.4 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)

1.5 SUBMITTALS

- A. Submit commissioning documents for all equipment and systems listed in table above per the requirements of Section 01 91 00 Commissioning.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION

- A. Refer to Section 01 91 00 Commissioning.

PART 3 - EXECUTION

3.1 INSTALLATION/START-UP VERIFICATION

- A. Perform all checks and tests included in the ISV checklists and complete the checklists as specified in Section 01 91 00 Commissioning.

3.2 FUNCTIONAL PERFORMANCE TESTS

- A. Perform all checks and tests included in the FPT checklists and complete the checklists as specified in Section 01 91 00 Commissioning.

3.3 TRAINING OF COLLEGE PERSONNEL

- A. Provide training of College’s personnel for the number of hours specified in the table below.

Equipment/System	Section Number	Orientation Hours	Training Hours	DVD Recording
Site HVAC and Plumbing Utilities	22 11 00	2	N/A	N/A

END OF SECTION 33 08 00

SECTION 33 08 10
COMMISSIONING OF WATER UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Acceptance checklist for commissioning of water utilities prior to putting water lines into service.

1.2 RELATED SECTIONS

- A. Section 33 11 00 Water Utility Distribution Piping
- B. Section 33 12 13.13 Backflow Preventers
- C. Section 33 13 00 Disinfection of Domestic Water Piping

1.3 SUBMITTALS

- A. Submit Form ISV-33 00 00 of Section 33 08 00 Commissioning of Water Utilities with all items on checklist completed, prior to commissioning.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 COMMISSIONING CHECKLIST

- A. Submit a copy of contract drawings marked up to show interim "As Built" conditions to the College's Representative for review with College Facilities Management Engineering Services. These drawings shall include valve and hydrant numbers.
- B. Conduct a job site meeting with the College's Representative, Contractor, and College Utility staff to review the Commissioning Checklist.
- C. Field verify that the interim "As Builts" are correct, the water system was installed per contract, all utility structures and control points are marked and numbered per the interim "As Builts".
- D. Field verify that all valve boxes are set to grade, properly labeled and painted.
- E. Provide documentation that all fire hydrants have been flow tested and accepted by the College Fire Department.
- F. Field verify that all fire hydrants are set to grade, properly labeled and painted.
- G. Verify that pipelines have passed hydrostatic and leakage tests per Section 33 11 00 Water Utility Distribution Piping.
- H. Verify meters have been calibrated and documentation submitted.
- I. Obtain final water and electric meter readings when Contractor is no longer responsible for the utility use.

- J. Verify backflow devices have been tested, passed and documentation submitted per Section 33 12 13.13 Backflow Preventers. Verify they have been painted and insulation blankets provided as required.
- K. Verify pipelines have been flushed and passed disinfection per Section 33 13 00 Disinfection of Domestic Water Piping.
- L. Verify all utility structures in active construction areas have been adequately marked, protected, and kept accessible to College at all times.
- M. Verify that all temporary water connections have been removed or left as agreed by College's Representative.
- N. Provide copies of Operations and Maintenance manuals as required.
- O. Provide spare parts and special tools as required.
- P. Provide training as required.
- Q. Utility Activation
 - 1. Contractor must submit a written utility activation request at least 5 days prior to the requested date of activation. The request must clearly indicate which lines or systems are being requested to be placed into service.
 - 2. List any remaining work to be completed and the anticipated date of completion in the utility activation request.
 - 3. Conduct a job site meeting with the College's Representative, Contractor, and College Utilities staff.
 - 4. Review the utility activation request, the Commissioning Checklist and verify all items have been completed or incomplete items are listed in the utility activation request.
 - 5. Review any special considerations for activating the utility.
 - 6. Utilities staff will activate the utility after all of the commissioning items have been completed.

END OF SECTION 33 08 10

SECTION 33 08 30
COMMISSIONING OF SANITARY SEWER UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Acceptance checklist for commissioning of sanitary sewer utilities prior to putting sewer lines and small package sanitary sewer pumping stations into service.

1.2 RELATED SECTIONS

- A. Section 33 08 00 Commissioning of Utilities

1.3 REFERENCES (NOT USED)

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Submit Form ISV-33 00 00 of Section 33 08 00 Commissioning of Utilities with all items on checklist completed, prior to commissioning.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 COMMISSIONING CHECKLIST

- A. Submit a copy of contract drawings marked up to show interim “As Built” conditions to the College's Representative for review by College Facilities Management Engineering Services. These drawings shall include valve and hydrant numbers. Hold a meeting at the job site with the College's Representative, the Contractor, and College Utility staff to review the Commissioning Checklist.
- B. Field verify that the interim “As Builts” are correct, that the sewer system was installed per contract, that all utility structures and control points are marked and numbered per the interim “As Builts”.
- C. Field verify that all manholes and cleanouts are set to grade and properly labeled.
- D. Verify that manholes have been visually inspected, leak tested and passed.
- E. Verify that gravity pipelines have been leak tested and passed.
- F. Verify that pipelines have been flushed.
- G. Verify that gravity pipelines have been deflection tested and passed.
- H. Verify that gravity pipelines have been television inspected and passed.
- I. Verify that force mains have passed hydrostatic and leakage tests per Section 33 31 00 Sanitary Utility Sewerage Piping.
- J. Verify that pump stations have been performance tested and passed.

- K. Verify that pump station wet wells have been leak tested and passed.
- L. Verify that flow meters have been calibrated.
- M. Verify all utility structures in active construction areas have been adequately marked, protected, and kept accessible to College staff at all times.
- N. Verify that all temporary sewer connections have been removed or left as agreed by College Utilities staff.
- O. Provide copies of Operations and Maintenance manuals as required.
- P. Provide spare parts and special tools as required.
- Q. Provide training as required.
- R. Utility Activation.
 - 1. The Contractor must submit a written utility activation request at least 5 days prior to the requested date of activation. The request must clearly indicate which lines or systems are being requested to be placed into service.
 - 2. List any remaining work to be completed and the anticipated date of completion in the utility activation request.
 - 3. Hold a meeting at the job site with the College's Representative, Contractor, and College Utilities staff.
 - 4. Review the utility activation request, the Commissioning Checklist and verify all items have been completed or incomplete items are listed in the utility activation request.
 - 5. Review any special considerations for activating the utility.
 - 6. Utilities staff will activate the utility after all of the commissioning items have been completed.

END OF SECTION 33 08 30

SECTION 33 11 00
WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pipe and fittings for site domestic and utility water lines.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 01 45 00 Quality Control
- C. Section 31 23 33 Trenching and Backfilling
- D. Section 33 05 26 Utility Line Signs, Markers, and Flags
- E. Section 33 12 16 Water Distribution Valves
- F. Section 33 13 00 Disinfection of Water Utility Distribution
- G. Section 33 08 10 Commissioning of Water Utilities

1.3 REFERENCES

- A. American Water Works Association (AWWA) C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- B. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems
- C. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings
- D. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- E. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
- F. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water
- G. AWWA C153/A21.53 - Ductile-Iron Compact Fittings for Water Service
- H. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
- I. AWWA C800 - Underground Service Line Valves and Fittings
- J. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In., for Water Transmission and Distribution
- K. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 Inches Through 48 Inches, for Water Transmission and Distribution
- L. The American Society of Mechanical Engineers (ASME) B16.1 - Gray Iron Pipe Flanges and Flanged Fittings (Classes 25, 125, and 250)
- M. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings
- N. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

- O. American Society for Testing and Materials (ASTM) A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature of High Pressure Service and Other Special Purpose Applications
- P. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- Q. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- R. State of California, Department of Health Services, "Criteria for the Separation of Water and Sanitary Sewer"

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Restraint Calculation: Provide calculations for mechanical restraint distances for all pipe joints. Provide data acknowledging that calculations provided conform to manufacturer's recommendations for size of pipe, type of pipe, and site soil type.
- F. Project Record Documents:
 - 1. Record location of pipe runs, connections, valves, thrust restraints and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- G. Results of testing.

PART 2 - PRODUCTS

2.1 PVC PIPE

- A. All pipe shall be continuously and permanently marked with manufacturer's name, pipe size, class or pressure rating in pounds per square inch (psi) units.
- B. Pipe, 4 inch through 12 inch: PVC pipe shall be bell and spigot type of materials specified in ASTM D1784, Class 12454, minimum Pressure Class 200, DR-14, conforming to AWWA C900. Outside diameter pipe dimension shall be manufactured to cast iron pipe equivalent. Underwriters' Laboratories, Inc. (UL) listed, Factory Mutual and National Sanitation Foundation (NSF) approved. Pipe shall be furnished in minimum standard lengths of 20 feet.
- C. Pipe, 14 inch and larger: PVC pipe shall be bell and spigot type minimum Pressure Class 165, DR- 25, conforming to AWWA C905. Outside diameter pipe dimension shall be manufactured to cast iron pipe equivalent. Underwriters' Laboratories, Inc. (UL) listed, Factory Mutual and National Sanitation Foundation (NSF) approved. Pipe shall be furnished in minimum standard lengths of 20 feet.
- D. Joints: Joints shall be cast iron mechanical joint type, bell and spigot, or push-on type, 250 pound working pressure. Bell and spigot type shall have elastomeric rubber ring joints,

conforming to AWWA C111. Elastomeric ring shall be factory bonded into bell grove and meet requirements of ASTM F477.

- E. Fittings: Fittings shall be ductile iron pipe conforming to AWWA C153, size 3 through 24 inch, and AWWA C110 greater than 24 inch, and shall be 350 psi working pressure rated. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.
- F. Mechanical Joint Restraints: Pipes shall be restrained using a wedge action, self-actuating lug type restraint device. PVC pipe mechanical restraints shall be manufactured by EBAA Iron Sales, StarGrip, or equal.
- G. Push-on Pipe Bell Joint Restraints: Pipes shall be restrained using a wedge action restraint on the spigot connected by tie bolts to a split serrated restraint on the bell. PVC Push-on Pipe Bell Joint Restraints shall be manufactured of high strength ductile iron in accordance to ASTM A536 Grades 65-14-12 for all sizes and shall be EBAA Iron Sales, StarGrip, or equal. Flanged outlets shall conform to ASME B16.1, 125 pounds. Bolts and nuts for flanges shall be Type 304 stainless steel, ASTM A193, Grade B8M hex head bolts and ASTM A194, Grade 8M, hex head nuts. Washers shall be of the same material as the bolts. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.
- H. Miscellaneous nuts and bolts shall be Type 304 stainless steel.

2.2 DUCTILE IRON PIPE

- A. Pipe: DIP pipe shall be Class 350 conforming to AWWA C151 with cement mortar lining in accordance with AWWA C104. Pipe shall be furnished in minimum standard lengths of 20 feet.
- B. Joints: Joints shall be either bell and spigot end, push-on type or cast iron mechanical joint type, 250 pound working pressure, with elastomeric rubber ring joints, conforming to AWWA C111.
- C. Fittings: Fittings shall be ductile iron pipe conforming to AWWA C153, size 3 through 24 inch, and AWWA C110 greater than 24 inch, and shall be 350 psi working pressure rated. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.
- D. Mechanical Joint Restraints: Pipes shall be restrained using a wedge action, self-actuating lug type restraint device. DIP pipe mechanical restraints shall be EBAA Iron Sales, StarGrip, or equal.
- E. Push-on Pipe Bell Joint Restraints: Pipes shall be restrained using a wedge action restraint on the spigot connected by tie bolts to a split restraint on the bell. DIP Push-on Pipe Bell Joint Restraints shall be manufactured of high strength ductile iron in accordance to ASTM A536 Grades 65-14-12 for all sizes and shall be EBAA Iron Sales, StarGrip, or equal. Flanged outlets shall conform to ASME B16.1, 125 pounds. Bolts and nuts for flanges shall be Type 304 stainless steel, ASTM A193, Grade B8M hex head bolts and ASTM A194, Grade 8M, hex head nuts. Washers shall be of the same material as the bolts. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.
- F. Miscellaneous nuts and bolts shall be Type 304 stainless steel.
- G. All ductile iron pipe and fittings shall be wrapped in polyethylene per AWWA C105.
- H. Exterior Soil Corrosion Protection for Pipe and Fittings: Polyethylene encasement, AWWA C105 and cathodic protection per Corrosion Protection Drawings and Specifications.

2.3 COPPER PIPE, LESS THAN 4 INCHES

- A. Piping, 1.5 inches and under: Seamless copper tubing conforming to AWWA C800, Type K, soft tempered
- B. Piping, 2 inches to 4 inches: Seamless copper tubing conforming to AWWA C800, Type K, hard temper
- C. Joints: Silfoss connections
- D. Fittings: Cast copper ASME B16.18 or wrought copper ASME B16.22
- E. Threaded connections shall be soft soldered.

2.4 ACCESSORIES

- A. Pipe Supports, Rods and Clamps: Socket clamps shall be stainless steel, four bolt type, equipped with stainless steel socket clamp washers and nuts Anvil Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.
 - 1. Rods shall be stainless steel, 3/4 inch diameter.
- B. All underground water piping shall be accompanied by a tracer wire and line marker as specified in Section 33 05 26, Utility Line Signs, Markers, and Flags.

PART 3 - EXECUTION

3.1 HANDLING AND STORAGE

- A. Handling: Pipe fittings and accessories shall be carefully inspected before and after installation and those found defects shall be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings and accessories shall be cleaned, and shall be maintained in a clean condition. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings or any other material be dropped or dumped into trenches.
- B. Storage: Pipe should be stored, if possible, at the job site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or deformation to bell ends of the pipe. Pipe should be stored in such a way as to prevent sagging or bending and protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Should the green color fade during storage to a point where, in the opinion of the College's Representative the color would not be clearly evident to a person uncovering a small portion of the pipe, the faded pipe shall be rejected. Gaskets should be stored in a cool, dark place out of the direct rays of the sun, preferably in original cartons.

3.2 INSTALLATION

- A. Bell-and-spigot pipe shall be laid with the bell end pointing in the direction of laying. Pipe shall be graded in straight lines, taking care to avoid the formation of any dips or low points. Pipe shall not be laid when the conditions of trench or weather are unsuitable. Pipe shall be supported at its proper elevation and grade, care being taken to secure firm and uniform support. Wood support blocking will not be permitted. The full length of each section of pipe and fittings shall rest solidly on the pipe bed, with recessed excavation to accommodate bells, joints and couplings. Anchors, thrust blocks, and supports shall be provided where necessary and where indicated on the Drawings for fastening work into place. Fittings shall be

independently supported.

- B. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.
- C. Follow manufacturer instructions, where such are provided, in all cases that cover points not shown on the Drawings or specified herein. Manufacturer's instructions do not take precedence over the Drawings and Specifications. Where manufacturer's instructions are in conflict with the Drawings and Specifications, submit the conflicting instructions to the College's Representative for clarification before performing the work.
- D. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. No wedge type roller cutters shall be permitted.
- E. Remove scale and dirt on inside and outside before assembly.
- F. Prepare pipe connections to equipment with flanges or unions.
- G. Bedding and Cover shall be as specified in Section 31 23 33 Trenching and Backfilling.
- H. Hand trim excavation for accurate placement of pipe to elevations indicated.
- I. Buried pipe shall have at least 36 inches of cover (for pipes sizes up to 8 inches), 40 inches of cover (for 10 inch pipe), 44 inches of cover (for 12 inch pipe), or 48 inches of cover (for pipe sizes 16 inches and greater), and 6 inches of clearance from other utilities. Horizontal and vertical separation of domestic water lines must conform to the State of California, Department of Health Services, "Criteria for the Separation of Water and Sanitary Sewer".
- J. Use fittings to make all changes in direction and size unless otherwise indicated on the Drawings.
- K. Maintain factory plastic end covers on the pipe during storage. Caps shall be removed upon installation of pipe to insure cleanliness.
- L. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, and then complete backfilling.
- M. Lay piping on a bed of the specified sand, at least 6-inches thick, on firm undisturbed earth. Remove loose rock, clods, and debris from the trench before placing bedding sand and before laying any pipe.
- N. The piping shall be made up with the pipe barrel bearing evenly along its full length on the sand bed on the bottom of the trench.
- O. In the case of steel or other rigid joint piping, excavate holes under joints and connections for access for making up, welding, testing and wrapping joints.
- P. Thoroughly clean out each section of pipe and fitting before lowering into the trench. Clean each pipe or fitting by swabbing-out, brushing-out, blowing-out with compressed air, washing-out with water, or by any combination of these methods necessary to remove all foreign matter.
- Q. If cleaned pipe sections and fittings cannot be placed in the trench without getting dirt into the open ends, tie tightly woven canvas or other type of approved cover over the ends of the pipes and fittings until they have been lowered into position in the trench. After removal of the covers in the trench, completely remove foreign matter from the pipe ends and fittings. Under no circumstances shall pipe be dropped or dumped into trench.
- R. Do not lower any pipe or fitting into a trench that contains water. Pump water from wet trenches, and keep the trenches dry until the joints have been completed and the open ends of the pipes have been closed with watertight plugs or bulkheads. Do not remove the plug or

bulkhead unless the trench is dry.

- S. Assemble lengths of PVC pipe such that centerline of two pipes being joined do not form an angle exceeding 3 degrees in any plane.
- T. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and shall not contribute odors. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated, clean applicator brushes.
- U. Transition plastic pipe to ductile iron when within 10 feet of a steam line. Provide 6 inches minimum thickness of powdered insulation around ductile iron sewer pipe when within 5 feet of steam line. Insulation shall be DriTherm, Gilsulate, or equal and installed according to manufacturer's recommendations.
- V. Install tracer wire on top of non-metallic pipe as specified in Section 33 05 26 Utility Line Signs, Markers and Flags.
- W. Install continuous line marker above top of pipe as specified in Section 33 05 26 Utility Line Signs, Markers and Flags.
- X. Polyethylene wrap on DIP shall be installed per manufacturer's recommendations.
- Y. Install air release valves on all pipeline high points. Refer to Section 33 12 16 Water Distribution Valves for valve installations.
- Z. Installation shall comply the Storm Water Pollution Prevention Plan requirements.
- AA. Corrosion protection to be installed per the Corrosion Protection Drawings and Specifications.

3.3 CONNECTIONS TO EXISTING WATER SYSTEM

- A. Utility interruption shall be in accordance with the Owner's work restrictions.
- B. In preparation for tie-ins to utility systems, the Contractor shall coordinate with the College's Representative before draining and/or blowing the existing piping prior to start of tie-in work by the Contractor. In all cases, the College will close the appropriate valves to isolate the area of work.

3.4 TESTING

- A. Water piping shall be hydrostatically tested at 150 psi pressure for two hours. Provide all instruments, facilities, and labor to conduct testing and placing in operation. Leakage rate shall not exceed 0.02 gallon per hour per inch diameter per 100 feet of buried piping.
- B. Piping shall be tested in sections. Testing under this Section shall be done before final connections to existing utility piping are made. Connections at existing utilities shall be visually inspected for leaks and all leaks repaired.
- C. Any part of the system, including all accessories, that shows failure during testing shall immediately be repaired or replaced with new materials. The system shall be completely retested after repair for replacement. This procedure shall be repeated, if necessary, until all parts of the system withstand the specified tests. No additional compensation will be provided for retesting.
- D. Tests shall be witnessed by the College's Representative. At least 48 hours notice of tests shall be given.
- E. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.

3.5 FLUSHING AND DISINFECTION

- A. All domestic water piping shall be flushed and disinfected upon installation. Refer to Specification Section 33 13 00 Domestic Water Piping Disinfection.

3.6 COMMISSIONING

- A. Prior to putting a water line in service, the Contractor shall conduct an acceptance checklist as required in Section 33 08 10 Commissioning of Water Utilities.

END OF SECTION 33 11 00

SECTION 33 11 19
FIRE SUPPRESSION UTILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pipe and fittings for fire water lines.
- B. Valves and Fire hydrants.
- C. All design, work, and materials described herein shall be approved by the College's Representative and by the local Fire Department. All work shall be designed in accordance with the National Fire Protection Association 13 (2016 edition). All shall also comply with Title 24, (2019) and the appropriate editions of the California Building Code and the California Fire Code.
- D. Work included for the Underground Fire Protection System:
 - 1. Connection to existing water main, as required.
 - 2. Underground fire sprinkler mains complete with underground risers ending at a point 5 feet-0 inches outside of the building with a blank flange bolted on top.
 - 3. New gate valves, and related pipe and fittings.
 - 4. Building and system designation signs on the fire department connections.
 - 5. Coordination of electrical conduit installation for supervisory systems.
 - 6. Painting of portions of the fire protection system.
 - 7. Compliance with the design requirements of the local Fire Department and College's Representative. Prepare shop drawings and details for the approval and installation of the system per NFPA 24 (2016 edition.)
 - 8. Coordination required to obtain approval of the local Fire Department and College's Representative.
 - 9. Arrangement for all required inspections by the local Fire Department and College's Representative. Cost of all testing and of special inspection required by them shall be paid by the Contractor.
 - 10. Provide all labor, materials and equipment required to complete the mechanical site utility work of the contract documents. Verify all existing utilities and exact locations prior to installation of new piping and provide all necessary trim and fittings for required connections.
 - 11. Fire Service double check valve assembly, OS&Y rising stem gate valves and fire department connections.
 - 12. New fire hydrants, key gate valves, and related pipe and fittings.
 - 13. Coordination of electrical conduit installation for alarm supervisory for systems.

1.2 REFERENCES

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012.

- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2013.
- C. American Society for Testing and Materials (ASTM) B 88 - Standard Specification for Seamless Copper Water Tube; 2014.
- D. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association; 1995 (ANSI/AWWA C104/A21.4).
- E. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 1999 (ANSI/AWWA C105/A21.5).
- F. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; 1995 (ANSI/AWWA C111/A21.11).
- G. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; 1996 (ANSI/AWWA C151/A21.51).
- H. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; 1999 (ANSI/AWWA C600).
- I. AWWA C606 - Grooved and Shouldered Joints; American Water Works Association; 1997.
- J. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution; American Water Works Association; 1997 (ANSI/AWWA C900/C900a).
- K. National Fire Protection Association (NFPA): NFPA 13, (2016 edition) "Standard for the Installation of Sprinkler Systems"; NFPA 14, (2016 edition) "Standard for the Installation of Standpipe and Hose Systems"; NFPA 24, (2016 edition) "Standards for the Installation of Private Fire Service Mains and Their Appurtenances"; as applicable.

1.3 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Underground fire protection shop drawings shall show all information required by NFPA 24 for Residential buildings.
- C. Materials List: Accompanying the Shop Drawings, submit a complete list of all materials proposed to be furnished and installed under this section, giving manufacturer's name and catalog number for each item.
- D. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide U.L. numbers for all materials submitted.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Shop Drawings: Prepare shop drawings and details for the approval and installation of the system per NFPA 24.
- G. NFPA 24 Underground Check list: Installing Contractor shall complete, sign, and submit NFPA 24 Underground Check List to College's representative.
- H. Project Record Documents: Record actual locations of piping mains, valves, connections, restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 SYSTEM DESCRIPTION OF UNDERGROUND FIRE PROTECTION

- A. All work shall be designed in accordance with the requirements of the applicable editions of National Fire Protection Association (NFPA) 13, 14, and 24, and the appropriate editions of the California Building code and the California Fire Code.
- B. Fire protection system lines shall be designed to avoid all other utility conduit and structural components shown on the Drawings. Fire protection system lines must give way to all gravity lines. Prior to completion of shop drawings, the Contractor shall coordinate the design of all work to be installed under this section with other work to avoid conflicts.
- C. Underground fire protection system shop drawings shall show all information required by NFPA 24.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 MATERIAL FOR UNDERGROUND FIRE PROTECTION SYSTEM

- A. All material installed under this section shall meet the following requirements:
 - 1. All material shall be in compliance with NFPA 13, (2016 editions).
 - 2. All material shall be new and currently listed in the Underwriters Laboratories, Inc., Fire Protection Equipment Directory, and/or the Factory Mutual Approval Guide for use as intended in underground fire line installations. Material that is pending approval shall not be acceptable.
 - 3. All vertical piping shall be cast or ductile iron.
 - 4. Uniflanges shall not be used on vertical piping or above ground. Tops of vertical risers shall be rodded down to the 90 degree bend at the base of the riser. Horizontal risers shall be rodded back to deadman of sufficient size to secure the flanged fitting.
 - 5. Cast or ductile iron pipe shall be installed within 5 feet of the building and under all footings and slabs.
 - 6. Fire department connection (FDC) shall be a 90 degree pattern with plugs and chains or sensible caps as identified on Drawings. Building System signs, acceptable to the local Fire Department, shall be installed on the fire department connection.
 - 7. Fire department connection check valve shall be installed at the top of the FDC riser with the FDC installed on top per Drawings.
 - 8. Control valve locks shall be provided by College, chains shall be provided by Contractor.

2.2 PVC PIPE

- A. All pipe shall be continuously and permanently marked with manufacturer's name, pipe size, class or pressure rating in pounds per square inch (psi) units.
- B. Pipe, 4 inch through 12 inch: PVC pipe shall be bell and spigot type of materials specified in ASTM D1784, Class 12454, minimum Pressure Class 200, conforming to AWWA C900. Outside diameter pipe dimension shall be manufactured to cast iron pipe equivalent. Underwriters' Laboratories, Inc. (UL) listed, Factory Mutual and National Sanitation Foundation (NSF) approved. Pipe shall be furnished in minimum standard lengths of 20 feet.

- C. Pipe, 14 inch and larger: PVC pipe shall be bell and spigot type minimum Pressure Class 165, conforming to AWWA C905. Outside diameter pipe dimension shall be manufactured to cast iron pipe equivalent. Underwriters' Laboratories, Inc. (UL) listed, Factory Mutual and National Sanitation Foundation (NSF) approved. Pipe shall be furnished in minimum standard lengths of 20 feet.
- D. Joints: Joints shall be cast iron mechanical joint type, bell and spigot, or push-on type, 250 pound working pressure. Bell and spigot type shall have elastomeric rubber ring joints, conforming to AWWA C111. Elastomeric ring shall be factory bonded into bell groove and meet requirements of ASTM F477.
- E. Fittings: Fittings shall be ductile iron pipe conforming to AWWA C153, size 3 through 24 inch, and AWWA C110 greater than 24 inch, and shall be 350 psi working pressure rated. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.
- F. Mechanical Joint Restraints: Pipes shall be restrained using a wedge action, self-actuating lug type restraint device. PVC pipe mechanical restraints shall be manufactured by EBAA Iron Sales, StarGrip, or equal.
- G. Flanged outlets shall conform to ASME B16.1, 125 pounds. Bolts and nuts for flanges shall be Type 304 stainless steel, ASTM A193, Grade B8M hex head bolts and ASTM A194, Grade 8M, hex head nuts. Washers shall be of the same material as the bolts. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.
- H. Miscellaneous nuts and bolts shall be Type 304 stainless steel.

2.3 DUCTILE IRON PIPE

- A. Pipe: DIP pipe shall be Class 350 conforming to AWWA C151 with cement mortar lining in accordance with AWWA C104. Pipe shall be furnished in minimum standard lengths of 20 feet.
- B. Joints: Joints shall be either bell and spigot end, push-on type or cast iron mechanical joint type, 250 pound working pressure, with elastomeric rubber ring joints, conforming to AWWA C111.
- C. Fittings: Fittings shall be ductile iron pipe conforming to AWWA C153, size 3 through 24 inch, and AWWA C110 greater than 24 inch, and shall be 350 psi working pressure rated. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.
- D. Mechanical Joint Restraints: Pipes shall be restrained using a wedge action, self-actuating lug type restraint device. DIP pipe mechanical restraints shall be EBAA Iron Sales, StarGrip, or equal.
- E. Flanged outlets shall conform to ASME B16.1, 125 pounds. Bolts and nuts for flanges shall be Type 304 stainless steel, ASTM A193, Grade B8M hex head bolts and ASTM A194, Grade 8M, hex head nuts. Washers shall be of the same material as the bolts. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.
- F. Miscellaneous nuts and bolts shall be Type 304 stainless steel.
- G. All ductile iron pipe and fittings shall be wrapped in polyethylene per AWWA C105.
- H. Exterior Soil Corrosion Protection for Pipe and Fittings: Polyethylene encasement, AWWA C105 and cathodic protection per the Corrosion Protection Drawings and Specifications.

2.4 COPPER PIPE, LESS THAN 4 INCHES

- A. Piping, 1.5 inches and under: Seamless copper tubing conforming to AWWA C800, Type K, soft tempered
- B. Piping, 2 inches to 4 inches: Seamless copper tubing conforming to AWWA C800, Type K, hard temper
- C. Joints: Silfoss connections
- D. Fittings: Cast copper ASME B16.18 or wrought copper ASME B16.22
- E. Threaded connections shall be soft soldered.

2.5 ACCESSORIES

- A. Pipe Supports, Rods and Clamps: Socket clamps shall be stainless steel, four bolt type, equipped with stainless steel socket clamp washers and nuts Anvil Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.
 - 1. Rods shall be stainless steel, 3/4 inch diameter.
- B. All underground water piping shall be accompanied by a tracer wire and line marker as specified in Section 33 05 26, Utility Line Signs, Markers, and Flags.

2.6 VALVES

- A. All gate valves 4-inch and larger in size shall conform to AWWA Standard Specification C509. All valves shall be iron body, bronze mounted, double-disk, parallel seat gate valves. All valves shall open by turning the stem counterclockwise. Buried valves shall be non-rising type with O ring seal equipped with 2 inch square operating nut, and shall be bituminous coated. End connections shall be flanged or mechanical joint as required for the type of pipe used. Buried valves shall have stem extensions to place operating nut within 6 inches of top of valve box.
- B. Tapping valve shall be cast iron, 200 psi working pressure, mechanical joint, with "O" ring seals, non-rising stem, Mueller H-667, Kennedy, or equal.
- C. Valves: Manufacturer's name and pressure rating marked on valve body.
- D. Gate Valves Up To 3 inches:
 - 1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.
- E. Swing Check Valves from 2 inches to 24 inches:
 - 1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.
- F. Valve Supervisory Switch:
 - 1. Potter OSYSU-1.
 - 2. System Sensor.
 - 3. Or equal.

2.7 HYDRANTS

- A. Hydrant shall be Clow Corporation Model #92, Slim Line, or equal (no known equal), low silhouette, with two 2-1/2 inch outlets and one 4-1/2 inch outlet. All outlets shall have National Standard fire hose thread.
- B. Hydrants shall be wet barrel type.

2.8 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 23 33 Trenching and Backfilling
- B. Cover: As specified in Section 31 23 33 Trenching and Backfilling

2.9 ACCESSORIES

- A. Tapping Sleeve: Cast iron or stainless mechanical joint type sleeve, sized specifically for actual O.D. and piping material, Mueller, Clow, or equal.
- B. Valve Boxes: Valve boxes shall be precast concrete with cast iron traffic covers. Traffic box shall be circular with the word WATER embossed on the top surface. Christy G-5, or equal (no known equal).
- C. Tracer Wire: Provide #10 insulated solid core copper trace wire installed parallel to piping and attached to valves as indicated on Drawings.
- D. Miscellaneous nuts and bolts shall be stainless steel.
- E. Rods and Clamps: Socket clamps shall be stainless steel, four bolt type, equipped with stainless steel socket clamp washers and nuts Grinnell Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.
 - 1. Rods shall be stainless steel, 3/4 inch diameter.
- F. Backflow Protection: Armored, double check type backflow preventer shall be approved on the most recent "List of Approved Backflow Prevention Assemblies," USC Foundation for Cross-Connection Control and Hydraulic Research. System-side OS&Y indicating-stem gate valve to be Underwriters Laboratory (UL) "Fire Protection Equipment" listed.
- G. Fire department connection (FDC): 4-inch by 2-1/2 inch 2-way (siamese) brass, dual clapper freestanding or integral with fire backflow assembly, brass finish with caps and chains as identified on Drawings. Building System signs, acceptable to the local Fire Department, shall be ordered and received from the Campus Sign Shop and installed on the fire department connection.
- H. Fire Protection Control valve locks shall be provided by the College, Contractor shall provide chains.

2.10 IDENTIFICATION MARKERS

- A. Identification Materials: Provide single selection for each product category stencils are not acceptable.
- B. Underground-Type Plastic Line Markers: Provide 6" wide by 4 mils thick multi-ply tape, consisting of solid metallic foil core between 2 layers of plastic tape. Markers to be permanent, bright colored, continuous printed, intended for direct burial service.

PART 3 - EXECUTION

3.1 EXAMINATION

College of Alameda Transportation Technology

20-175

Issue Date:

Revision Date:

- A. Verify that building service connection and Campus water main size, location, and invert are as indicated.

3.2 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.3 EXCAVATION, TRENCHING, AND BACKFILLING

- A. See Section 31 23 33 Trenching and Backfilling
- B. Special preparation shall be taken to keep the inside of the piping clean of all debris, especially sand, during installation and testing. Maintain factory covers on open ends of pipe until lowered into trench.
- C. After testing and acceptance, the trench shall be backfilled with sand for the first 12-inch depth. Mechanical tamping of rock-free soil shall be carefully done to achieve a minimum of 90 percent compaction at depth of 12 inches and below, and 95 percent compaction for top 12 inches of depth.
- D. Hand trim excavation for accurate placement of pipe to elevations indicated.
- E. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, and then complete backfilling.

3.4 GENERAL INSTALLATION

- A. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.
- B. Follow manufacturer instructions, where such are provided, in all cases that cover points not shown on the Drawings or specified herein. Manufacturer's instructions do not take precedence over the Drawings and Specifications. Where manufacturer's instructions are in conflict with the Drawings and Specification, submit the conflicting instructions to the College's Representative for clarification before performing the work.
- C. Use fittings to make all changes in direction and size unless otherwise shown on the Drawings.
- D. Maintain factory plastic end covers on the pipe during storage. Caps shall be removed upon installation of pipe to insure cleanliness.
- E. Installation of Backflow Assemblies shall not be considered complete until tested by a certified tester.
- F. Corrosion protection to be installed per the Corrosion Protection Drawings and Specifications.

3.5 INSTALLATION OF UNDERGROUND FIRE PROTECTION SYSTEM

- A. Connect to the new or existing Campus water mains and comply with the following requirements and procedures:
 - 1. Piping shall be installed in accordance with the requirements of NFPA 13 (2016 edition), and the appropriate editions of the California Building code and the California Fire Code.
 - 2. Give special attention to materials and coatings. A backflow prevention assembly is required on all fire lines in accordance with the requirements of the applicable editions of

National Fire Protection Association (NFPA) 13, 14, and 24, and the appropriate editions of the California Building code and the California Fire Code.

3. Underground piping and backfill shall be installed in strict accordance with the Manufacturer's Installation Guide.
4. All mechanical restraints shall be designed to conform to the requirements of NFPA 24. Design of mechanical restraints shall be shown on shop drawings.
5. All equipment shall be properly rodded. The Contractor shall be responsible for the proper design and installation of the equipment. Shop drawings shall show details of rodding.
6. The underground fire protection system installer shall furnish and install all sleeves required for the work where it passes through concrete. If sleeves are not installed, all penetrations shall be core drilled. Coordinate criteria with College's Representative. All penetrations shall be approved by the College's Representative and by the local Fire Department before drilling. All penetrations shall be in accordance with NFPA Standard #13 and #24.
7. The tops of the Fire Department connections shall be 36 inches above grade, or as approved by the College's Representative and the local Fire Department. The devices shall be painted and signage provided as specified by the local Fire Department.

3.6 CONNECTIONS TO EXISTING WATER MAINS

- A. Under no circumstances shall existing lines or utilities be interrupted without prior approval of the College. Submit a request for this approval to the College's Representative, and also state the maximum duration of shutdown. The Contractor's schedule may have to be adjusted or work performed during off-hours.
- B. Schedule all outages for utility tie-in work well in advance and by written notice to the College's Representative at least 7 working days in advance of the desired shutdown.
- C. In preparation for tie-ins to the utility systems, the Contractor shall coordinate with the College's Representative before draining or blowing the existing piping prior to start of tie-in work by the Contractor. In all cases, the College will close the appropriate valves to isolate the area of work.

3.7 FLUSHING

- A. The entire piping system shall be thoroughly flushed out until reasonably clean in the opinion of the local Fire Department inspector through the College's Representative. All tests shall be conducted at such times as directed by and in the presence of the local Fire Department inspector through the College's Representative.

3.8 INSTALLATION - VALVES AND HYDRANTS

- A. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- D. Hydrant shall be installed with the outlets facing the street, with 4-1/2 inch opening no less than 2 feet or more than 7 feet from the street curb or edge of pavement.
- E. The center of the lowest outlet shall be no less than 18 inches above finished grade.

- F. Hydrants to be painted by College in accordance with National Fire Protection Association (NFPA) NFPA 24, edition 2016 requirements.
- G. Where subject to mechanical injury, hydrants to be protected in accordance with the requirements of the applicable editions of National Fire Protection Association (NFPA) 13, 14, and 24, and the appropriate editions of the California Building code and the California Fire Code, so as not to interfere with connection to the outlets.

3.9 PIPE TESTING

- A. Water piping from the backflow device to the building riser shall be hydrostatically tested at 200 psi pressure for two hours in accordance with NFPA 24, "Standards for the Installation of Private Fire Service Mains and Their Appurtenances" and proven watertight. Provide all instruments, facilities, and labor to conduct testing and placing in operation. Water piping from the backflow device to the main shall be tested in accordance with Section 33 11 00 Water Distribution.
- B. Piping may be tested in sections. Testing under this Section of the work shall be done before final connections to existing utility piping are made, with the provision that subsequent leaks, if developed, at these conditions shall be corrected.
- C. Any part of the system, including all accessories, that shows failure during testing shall immediately be repaired or replaced with new materials. The system shall be completely retested after repair for replacement. This procedure shall be repeated, if necessary, until all parts of the system withstand the specified tests. All retesting costs shall be at no additional cost to the College.
- D. Leakage rate shall hold with no loss over a 2-hour test period.
- E. Tests shall be witnessed by the College's Representative and local Fire Department. At least 48 hours notice of tests shall be given.
- F. Underground piping shall be center-loaded and all fittings, joints and strapping shall be exposed for hydrostatic pressure testing and inspection.
- G. Piping shall be inspected, pressure tested and flushed according to the procedures set forth in NFPA 13 and 24. An inspection of underground installation, backflush, and hydrostatic test shall be conducted by the Contractor and witnessed by the College's Representative and by a representative of the local Fire Department prior to backfill.

3.10 DISINFECTION

- A. Disinfect fire hydrant lateral and fire sprinkler line from point of connection to double check assembly per Section 33 13 00 Disinfection of Domestic Water Piping.

END OF SECTION 33 11 19

SECTION 33 12 13.13
WATER SUPPLY BACKFLOW PREVENTION ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Backflow preventer assemblies.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 01 45 00 Quality Control
- C. Section 33 12 16 Water Distribution Valves

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) A536 – Standard Specification for Ductile Iron Castings
- B. American Water Works Association (AWWA) C511 – Standard for Reduced Pressure Principle Backflow Prevention Assembly
- C. College of Southern California, Foundation for Cross-Connection Control and Hydraulic Research (USC-FCCCHR) list
- D. Title 17, Division 1, State Department Of Health Services, Chapter 5. Sanitation (Environmental), Group 4, Drinking Water Supplies, Article 1, General
- E. California State Health and Safety Code

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - 1. Project Record Documents,
 - 2. Record location of backflow prevention assemblies.
 - 3. Provide a copy of test results for each backflow prevention assembly.

PART 2 - PRODUCTS

2.1 BACKFLOW PREVENTERS

- A. Reduced pressure type backflow preventers shall be used for domestic water service and double check devices shall be used for fire service, matching service size.

- B. Reduced pressure backflow preventers and double check devices shall be of the following materials:
 - 1. Main valve body: Ductile Iron ASTM A536, Grade 4
 - 2. Access Covers: Ductile Iron ASTM A536, Grade 4
 - 3. Internals: Stainless Steel, 300 Series and NORYL™, or equal
 - 4. Fasteners and Springs: Stainless Steel, 300 Series
 - 5. Seal Rings: EPDM
 - 6. O-rings: Buna Nitrile
- C. Reduced pressure backflow prevention devices 2.5 inches and larger shall be Febco 825YD, Watts 909 series, Wilkins 375A, or equal.
- D. Reduced pressure backflow prevention devices 2 inches and smaller shall be Febco 825Y series, Watts 909 or 009 series, Wilkins 975XL series, or equal.
- E. Double check assemblies 2.5 inches and larger shall be Febco 805YD, Watts 709, Wilkins 350A OSY, or equal.
- F. Double check assemblies 2 inches and smaller shall be Watts 007, Wilkins 950XL, or equal.
- G. Check valve seats shall have field replaceable seat rings.

2.2 ACCESSORIES

- A. All pipes, valves, pipe or plumbing fittings, fixtures, solder, or flux intended to convey or dispense water for human consumption shall be lead free.
- B. Devices used on fire services must have OS&Y valves with tamper switches and shall not have a detector meter.
- C. An insulated, lockable, UV resistant blanket type cover shall be provided for all reduced pressure principle devices and double check devices (fiberglass jacketing is not acceptable). The cover shall be a manufactured product with Velcro or equal bottom, top, and one end minimum. Brass grommets shall be required every 12 inches in the Velcro areas.
- D. All devices that are ferrous metal and above grade piping shall be epoxy coated. All devices and piping shall be painted Hunter Green Semi-Gloss (ICI Devoe DC5517 or equal) Fire Department connections shall be painted Semi-Gloss White (ICI Devoe Devflex-659, Semi Gloss 4206).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Backflow preventers shall be installed in accordance with the manufacturer's instructions and College of Southern California, Foundation for Cross-Connection Control and Hydraulic Research (USC-FCCCHR). Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.
- B. Installation shall also conform to the requirements of Section 33 12 16 Water Distribution Valves.

3.2 TESTING

- A. Backflow prevention devices shall meet the factory, laboratory and field test provisions of AWWA C511.
- B. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control. Testers must be certified by AWWA and must provide a valid copy of a Backflow Prevention Assembly General Tester Certificate to the College's Representative.
- C. Backflow preventers shall be tested immediately after they are installed, relocated or repaired. Backflow preventers shall not be placed in service unless they are functioning as required and have been approved by the College's Representative.

END OF SECTION 33 12 13.13

SECTION 33 12 16
WATER DISTRIBUTION VALVES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Water distribution valves and appurtenances.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 01 45 00 Quality Control
- C. Section 33 11 00 Water Utility Distribution Piping

1.3 REFERENCES

- A. American Society of Mechanical Engineers (ASME) B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Metric/Inch Standard
- B. American Society for Testing and Materials (ASTM) A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
- C. ASTM A276 - Stainless and Heat Resisting Steel Bars and Shapes
- D. ASTM A536 - Ductile Iron Castings
- E. ASTM B148 - Aluminum-Bronze Sand Castings
- F. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings
- G. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings – (Reinstated)
- H. American Water Works Association (AWWA) C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- I. AWWA C504 – Rubber-Seated Butterfly Valves
- J. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. Through 24 In. NPS
- K. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service
- L. AWWA C550 - Protective Interior Coatings for Valves and Hydrants
- M. AWWA C800 - Underground Service Line Valves and Fitting.

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

- E. Project Record Documents:
 - 1. Record location of valves and invert elevations.

PART 2 - PRODUCTS

2.1 GATE VALVES

- A. Valves of the same size and service shall be provided by a single valve manufacturer. Packing shall be non-asbestos material. Actual length of valves shall be within 1/16 inch (plus or minus) of the manufacturer's specified length.
- B. Gate Valves Less Than 2 Inches:
 - 1. Valves shall be Class 125 minimum, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, and extension box.
 - 2. Valve body shall be of Brass or Bronze material.
 - 3. Gate valves less than 2 inches shall be Stockham Model B103/B104, Nibco Model T-113/S-113, or equal.
- C. Gate Valves 2 inch through 12 inch:
 - 1. Valves shall be resilient seated gate valve. Valves greater than 4 inches shall comply with AWWA C509.
 - 2. Valves shall open by turning the stem counterclockwise. Buried valves shall be non-rising type with O-ring seal equipped with 2 inch square operating nut, and shall be bituminous coated. Buried valves shall have stem extensions to place operating nut within 6 inch of top of valve box. End connections shall be flanged ends or mechanical joint as required for the type of pipe used. Working pressure shall be 250 psi.
 - 3. Flanges shall meet the requirement of ASME B16.5. Mechanical joints shall meet the requirements of AWWA C111.
 - 4. Valve materials shall be as follows:
 - a. Body and Bonnet: Cast or ductile iron, ASTM A126, Class
 - b. Wedge: Cast iron, ASTM A126, Class B
 - c. Resilient seal: Buna N
 - d. Stem: Stainless Steel AISI 420
 - e. Stem Nut: Brass
 - f. Fasteners and hardware: Type 304 stainless steel
 - 5. Gate valves 2 inches through 12 inches shall be American Flow Control Series 2500, Mueller 2360 Series, or equal.
- D. Manufacturer's name and pressure rating shall be marked on valve body.
- E. Gate valve interior and exterior body and bonnet shall be fusion bond epoxy coated per requirements of AWWA C550.
- F. Factory hydrostatic testing of valves shall be required for valves greater than 20 inches. Results of factory testing shall be submitted conforming to Section 01 33 00 Submittals.

2.2 BUTTERFLY VALVES

- A. Valves of the same size and service shall be provided by a single valve manufacturer. Packing shall be non-asbestos material. Actual length of valves shall be within 1/16 inch (plus or minus) of the manufacturer's specified length.
- B. Butterfly Valves Greater than 12 inches: Valves shall be AWWA C504, flanged or mechanical joint type and have a rubber seat. Valve discs shall rotate 90 degrees from the full open position to the tight shut position. Valve seat shall provide a drip tight shutoff at a pressure differential of 150 psi upstream and 0 psi downstream in either direction.
- C. Butterfly valve materials shall be as follows:
 - 1. Body and cover: Cast iron, ASTM A126, Class B
 - 2. Disc: Cast iron, ASTM A126, Class B with Type 316 stainless steel seating edge
 - 3. Seat: Buna-N
 - 4. Shafts: Stainless steel, ASTM A276, Type 304
 - 5. Fasteners and hardware: Type 304 stainless steel
- D. The valve operator shall be the traveling nut type. Valve shall open with a counter-clockwise rotation of the 2 inch operating nut and have O-ring seals. Valve operator components shall withstand an input torque of 300 ft-lbs at the extreme operator positions without damage.
- E. Manufacturer's name and pressure rating marked on valve body.
- F. Butterfly valve wetted parts shall be coated with fusion bonded epoxy per requirements of AWWA C550.
- G. Factory hydrostatic testing of valves shall be required for valves greater than 20 inches. Results of factory testing shall be submitted conforming to Section 01 33 00 Submittals.
- H. Butterfly valves shall be Pratt Groundhog Buried Service, Mueller Lineseal III, or equal.

2.3 CHECK VALVES

- A. Valves of the same size and service shall be provided by a single valve manufacturer. Packing shall be non-asbestos material. Actual length of valves shall be within 1/16 inch (plus or minus) of the manufacturer's specified length.
- B. Check valves 2 inches and smaller:
 - 1. Valves shall be AWWA C508, Class 150 bronze swing check valves with Y-pattern body and threaded ends. Rotating disk design and regrindable seat.
- C. Check valves greater than 2 inches:
 - 1. Valves shall be AWWA C508, adjustable spring tension. The design of the spring attachment shall permit adjustment of closing force by tensioning the spring or replacement with different active length springs.
 - 2. Disc and lever arms shall be keyed to the shaft and retained by bushings or pins.
 - 3. Unless otherwise specified, valves 2 inches through 12 inches shall have a minimum working pressure of 175 psi. Valves greater than 12 inches shall have a minimum working pressure of 150 psi.
- D. Check valves wetted parts shall be coated with fusion bonded epoxy per requirements of AWWA C550.

E. Check valve materials shall be as follows:

1. Body and cover: Cast iron, ASTM A126, Class B or Bronze ASTM B62
2. Disc: Ductile iron, ASTM A536 or Bronze ASTM B61
3. Seat rings: Aluminum bronze, ASTM B148 or Stainless steel, ASTM A276, Type 316
4. Hinge shafts and hinge pins: Stainless steel, ASTM A276, Type 301 or 304
5. Shaft bushings: Bronze, AWWA C508
6. Fasteners and hardware: Type 304 stainless steel

2.4 CORPORATION STOPS

- A. Valves of the same size and service shall be provided by a single valve manufacturer. Packing shall be non-asbestos material. Actual length of valves shall be within 1/16 inch (plus or minus) of the manufacturer's specified length.
- B. Corporation stops for smaller service lines shall be ball type, conforming to AWWA C800, maximum working pressure of 300 psig.
- C. Stem rotation shall be a full 360 degrees.
- D. Corporation stop materials shall be as follows:
 1. Body: Brass, 85-5-5-5 ASTM B62
 2. Seat Seal: Stainless steel
 3. Fasteners and hardware: Type 304 stainless steel
- E. Corporation stops shall be Mueller or equal.

2.5 VALVE BOXES

- A. Valve boxes shall be precast concrete with cast iron traffic covers. Traffic box shall be circular with the word WATER embossed on the top surface of the lid.
- B. Valve boxes shall be Christy G-5, Brooks, or equal.
- C. Valve box cover shall be painted light blue (ICI Devoe DC4100 semi gloss or equal) for domestic water valves and white (ICI Devoe DevFlex-659 White Semi Gloss 4206 or equal) for utility water valves. An identification number shall be welded onto the valve box rim with 1-inch high text. Identification numbers shall be assigned by the College's Representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Valve installation shall be in accordance with details. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. For valves without valve boxes, stainless steel tags bearing the specified valve identification number stamped in 1/2-inch high letters shall be installed on valve flanges in a position visible from floor level. Flangeless valves 8 inches in diameter and larger shall have tags attached to the valve body by self-tapping corrosion resistant metal screws. Flangeless valves 6 inches in diameter and smaller shall have tags attached to the valve stem by stainless steel wire or nylon

tie. Wire shall be 0.063 inch minimum. Identification numbers shall be assigned by a College's Representative.

D. Valves shall be installed in the closed position.

3.2 TESTING

- A. Water distribution valves shall be tested according to manufacturer's instructions and according to system testing requirements of Section 33 11 00 Water Utility Distribution Piping.
- B. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.

END OF SECTION 33 12 16

SECTION 33 12 19
FIRE HYDRANTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Fire hydrants.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 01 45 00 Quality Control

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) A536 - Standard Specification for Ductile Iron Casting.
- B. American Water Works Association (AWWA) C503 - Wet-Barrel Fire Hydrants.
- C. National Fire Protection Association (NFPA) 13 - Standard for the Installation of Sprinkler Systems
- D. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems
- E. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- F. Underwriters Laboratories, Inc (UL) 246 - Hydrants for Fire Protection Service

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents:
 - 1. Record location of fire hydrants

PART 2 - PRODUCTS

2.1 FIRE HYDRANTS

- A. Fire hydrants shall conform to AWWA C503 and shall be listed by Underwriters Laboratories, Inc. in accordance with UL 246.
- B. Hydrants shall be wet barrel type, low silhouette, with two 2-1/2 inch outlets and one 4-1/2 inch outlet. All outlets shall have National Standard fire hose thread.
- C. Hydrants shall be ductile cast iron conforming to ASTM A536.

- D. Hydrants shall be Clow Corporation Model #92 (Slim Line), or equal (no known equal).
- E. Break away bolts or spool, and swivel adapter shall be provided.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hydrants shall be installed per manufacturer recommendations and as detailed. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- B. Hydrants shall be installed with the outlets facing the street, with 4-1/2 inch opening no less than 2 feet or more than 7 feet from the street curb or edge of pavement.
- C. The center of the lowest outlet shall be no less than 18 inches above finished grade.
- D. Street valve serving the hydrant shall be located at point of connection to the main and no less than 10 feet from the hydrant.
- E. Hydrants to be painted by the Contractor in accordance with NFPA 24 requirements and College Fire Prevention Services specifications. Hydrant body shall be painted white (ICI Devoe Devflex-659 Semi Gloss 4206 or equal).
- F. Where subject to mechanical injury, hydrants shall be protected in accordance with the requirements of the applicable editions of NFPA 13, 14, and 24, and the appropriate editions of the California Building Code and the California Fire Code, so as not to interfere with connection to the outlets.

3.2 TESTING

- A. Hydrant testing shall be conducted by the Contractor. Coordinate witness test with College's Representative to have a College Fire Prevention Services representative in attendance. Fire hydrants shall meet the factory and field test provisions of AWWA C503. At least 48 hours notice of tests shall be given.
- B. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.

END OF SECTION 33 12 19

SECTION 33 12 33
WATER UTILITY METERING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Meters for water utility service.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 01 45 00 Quality Control
- C. Section 33 08 10 Commissioning of Water Utilities

1.3 REFERENCES

- A. American Water Works Association (AWWA) C702 – Cold Water Meters – Compound Type
- B. AWWA M6 – Water Meters – Selection, Installation, Testing, and Maintenance

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents:
 - 1. Record location of meters
 - 2. Provide copy of commissioning report per Section 33 08 10 Commissioning of Water Utilities.

PART 2 - PRODUCTS

2.1 FLOW METERS

- A. Domestic Water and Industrial Cold Water:
 - 1. Compound type meter with totalizer, 1 pulse/10 gallons; Sensus Omni C2, or equal.
- B. Reverse Osmosis Water and Fertilizer Water:
 - 1. Thermoplastic disc meter; Badger Model 40 with LCD 4-20 encoder, or equal.

2.2 REPEATER TOTALIZER

- A. Provide a Sensus ACT-PAK Model 713AC or equal Repeater Totalizer if the meter is installed where it cannot be easily read directly.

2.3 STRAINERS

- A. Meters greater than 2 inches shall be provided with a Sensus AWWA or equal type bronze strainer upstream of the meter, including a valved meter by-pass assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Meters shall be installed per manufacturer's recommendation and have proper upstream and downstream straight pipe lengths for meter accuracy.
- B. Meter to be accessible for maintenance personnel. Provide valved by-pass around meter for removal for maintenance.
- C. Connect the impulse contactor to the repeater totalizer (if provided) or the power meter. Connect the repeater totalizer (if provided) or the power meter.

3.2 TESTING

- A. Water meters shall meet the factory, laboratory and field test provisions of AWWA C702 and AWWA M6.
- B. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.

END OF SECTION 33 12 33

SECTION 33 13 00
DISINFECTION OF DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. This specification applies to the installation of all new and repaired potable (domestic) water lines. All new domestic water lines shall be disinfected before they are connected to existing piping and placed in service. All domestic water lines taken out of service for inspection, repair, or other activities that might lead to contamination of water shall be disinfected before they are returned to service.
- B. Except as specifically noted, Contractor shall furnish all labor, equipment, and materials to prepare, disinfect and test domestic water lines in conformity with the procedures and standards described in this section.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 33 11 00 Water Distribution Piping

1.3 REFERENCES

- A. American Water Works Association (AWWA) C651- AWWA Standard for Disinfecting Water Mains and applicable local and government regulations.
- B. AWWA B300 – Hypochlorites
- C. AWWA M12 - Simplified Procedures for Water Examination – Fifth Edition
- D. Standard Methods for the Examination of Water and Wastewater

1.4 SUBMITTALS

- A. Submit a Disinfection Plan describing flushing procedures; type, form, and dose of disinfectant to be used; proposed locations for adding disinfectants and collecting disinfection verification samples; final flushing procedures; and location for disposal of flushing water.
- B. Following completion of disinfection, provide a Disinfection Certification Report confirming compliance with specification to the College's Representative. This report, together with acceptable disinfection verification sample results collected and analyzed by the College's Representative will form the basis for approval of disinfection.
- C. Submit in accordance with Section 01 33 00 Submittals.

1.5 SUPERVISION AND TESTING

- A. Disinfection shall not commence until the College's Representative has accepted the Disinfection Plan. The College's Representative shall supervise the start of disinfection and the conclusion of the disinfection retention period.
- B. Unless otherwise approved by the College's Representative the final disinfection verification water samples will be collected by the College's Representative with analysis performed by a

California Department of Health Services laboratory selected and paid for by the College.
Contractor shall assist the College's Representative in completing this task.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The following forms of chlorine are approved for use as disinfecting agents:
 - 1. Sodium hypochlorite in liquid form, conforming to American National Standards Institute/American Water Works Association (ANSI/AWWA) B300.
- B. Contractor shall comply with all applicable local, state and federal regulations concerning transport, handling and reporting of the materials used for disinfection.

PART 3 - EXECUTION

3.1 PREVENTIVE AND CORRECTIVE MEASURES DURING CONSTRUCTION

- A. General. The procedures of this section must be observed to assure that water pipelines and appurtenances have been thoroughly cleaned for the final disinfection by chlorination. New pipelines must be isolated until bacteriological tests described in this section, are satisfactorily completed and disinfection is approved by the College's Representative.
- B. Keeping pipe clean and dry. The interiors of pipes, fitting, and valves shall be protected from contamination. Pipe delivered for construction shall be strung to minimize the entrance of foreign material. All opening in the pipelines shall be closed with water tight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.
- C. Packing materials. Yarning or packing material shall consist of molded or tubular rubber rings, rope of treated paper, or other approved materials. Materials such as jute or hemp shall not be used. Packing material shall be handled in a manner that avoids contamination. Packing materials are only acceptable if specified as part of the piping system and provided in accordance with piping requirement specified in other sections of specification. Refer to piping specification Section 33 11 00 Water Utility Distribution Piping,
- D. Sealing materials. No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. Sealing materials are only acceptable if specified as part of the piping system and provided in accordance with piping requirement specified in other sections of specification. Refer to Section 33 11 00 Water Utility Distribution Piping,
- E. Cleaning and swabbing. If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a 1 to 5 percent hypochlorite disinfecting solution. If, in the opinion of the College's Representative, the dirt remaining in the pipe will not be removed using the flushing operation, then the interior of the pipe shall be cleaned using mechanical means, such as a hydraulically propelled foam pig (or other suitable device acceptable to the College's Representative in conjunction with the application of a 1 percent hypochlorite disinfecting solution. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the College's Representative.

- F. Flooding by storm or accident during construction. If the pipeline is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the pipeline. After construction is completed, the pipeline shall be disinfected using the continuous-feed method.

3.2 METHODS OF CHLORINATION

- A. General. The continuous feed method shall be used for disinfection. AWWA's "tablet method" and "slug method" are not allowed. All valves, faucets, and fixtures shall be installed and piping installation shall be completed before chlorination is initiated.
- B. Notification and Scheduling. Contractor shall notify the College's Representative of their intent to begin the disinfection process. Prior to scheduling this work, the disinfection submittal must have been approved by the College. The Contractor will coordinate the disinfection, final flushing, and disinfection verification sampling with the College's Representative at least 72 hours prior to commencing chlorination. Disinfection verification sampling must be scheduled only on Mondays, Tuesdays, Wednesdays or Thursdays and be completed prior to 3:30 P.M.
- C. Preflushing of source water. The source water (typically a College fire hydrant) used for disinfection and pressure testing shall be flushed prior to its use to ensure that contaminants or debris are not introduced into the new pipe. Flushed water shall not be discharged, either directly or indirectly, into campus storm drainage systems. Flushed water shall either be discharged into the campus sanitary sewer system, or managed in a manner to retain the water on site. The College's Representative will provide the Contractor a location to discharge flushing water during formation of the Disinfection Plan.
- D. Preliminary flushing. Before the pipeline is chlorinated, it shall be filled to eliminate air pockets and flushed to remove particulates. The flushing velocity in the pipeline shall not be less than 2.5 ft/s unless the College's Representative determines that conditions do not permit the required flow to be discharged to waste. As practical, as determined by the College's Representative, all fixtures shall be flushed in the full-open position until the water is clear. The College's Representative will provide the Contractor the duration of flushing at 2.5 ft/s during formation of the Disinfection Plan.
- E. Critical service disruptions. When emergency eyewashes and/or emergency showers for in-use laboratories are removed from service due to disinfection procedures, alternative emergency eyewashes and showers shall be provided.
- F. Procedure for chlorinating the pipeline.
 - 1. Water supplied from a temporary, backflow-protected connection to the existing domestic water system shall flow at a measured rate into the newly installed water pipeline. In the absence of a meter, the rate may be approximated using a Pitot gauge in the discharge, measuring the time to fill a container of known volume, or other approved method.
 - 2. A service cock shall be installed on piping intended for disinfection for the introduction of hypochlorite solution and for use as a sample bib for testing purposes. Service cock shall be located no more than 10 feet downstream of the supply point for disinfection water.
 - 3. For disinfection of hot water systems, the temperature of the hot water system shall be reduced to that of the cold water system before initiating chlorination.

4. Prior to initiating chlorination, each outlet and valve shall be posted with signs indicating water may not be used; e.g., "Do Not Use", "Chlorinated Water – Do Not Drink". Postings must be made in English and Spanish. Water lines must remain isolated from use, and faucets and valves must remain posted until conditional or final approval for use has been given by College's Representative.
5. At a point not more than 10 feet downstream from the beginning of the new pipeline, water entering the new pipeline shall receive a dose of hypochlorite fed at a constant rate such that the water will have not less than 25 mg/L and not more than 35 mg/L free chlorine. To ensure that this concentration is provided, measure chlorine concentration at regular intervals in accordance with the procedures described in the current edition of Standard Methods for the Examination of Water and Wastewater or AWWA Manual M12, or using approved chlorine test kits. The hypochlorite solution may be applied to the water pipeline with a gasoline or electrically powered chemical-feed pump designed for feed chlorine solutions. Feed lines shall be made of material capable of withstanding the corrosion caused by the concentrated chlorine solutions and the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the pipeline.
6. All fixtures shall be partially opened to allow for a simultaneous trickle of flow. Chlorine application shall not cease until the entire pipeline is filled with heavily chlorinated water, as verified by measurements at the fixtures. The College's Representative will witness the initial concentrations measured by the Contractor and may take disinfection verification samples to confirm compliance. Following verification of chlorination, each outlet and valve shall be closed.
7. The chlorinated water shall be retained in the pipeline for at least 24 hours, but not more than 48 hours, unless approved by the College's Representative. At the end of the retention period, the treated water in all portions of the pipelines shall have residual of not less than 10 mg/L of free chlorine.

G. Final Flushing.

1. Clearing the pipeline of heavily chlorinated water. After the application retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main fittings, valves, and branches until chlorine measurements show that the concentration of the water leaving the pipeline is no higher than that generally prevailing in the distribution system or 0.5 ppm. The College's Representative shall take samples and determine the chlorine concentration of the flush water.
2. Disposing of heavily chlorinated water. Flushed water shall not be discharged, either directly or indirectly, into campus storm drainage systems. Flushed water may be discharged into the campus sanitary sewer system if approved by the College Representative, otherwise Contractor is responsible to retain the water on site, remove and dispose off-site in accordance with applicable regulations.

3.3 DISINFECTION VERIFICATION

- A. Sampling. After final flushing and before the new water pipeline is connected to the distribution system, 2 consecutive sets of samples, taken at least 24-hours apart, shall be collected from the new pipeline. Under normal circumstances, the first set of samples will be collected immediately following final flushing. At a minimum, the College's Representative will take samples every 1,000 feet of pipeline, plus 1 set from the end of the pipeline, and at

least 1 set from each branch. The Contractor shall provide dedicated and clean sampling taps at these locations. A corporation cock may be installed in the pipeline with a copper-tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use. The number and location of samples from fixtures is at the discretion of the College's Representative and shall be determined on a project specific basis. The source water will also be sampled. The College will test the samples for bacteriological quality, turbidity, and pH in accordance with Standard Methods for the Examination of Water and Wastewater. For approval by the College's Representative, 2 consecutive sets of samples from each location shall show the absence of coliform organisms and turbidity and pH consistent with that of the source water.

- B. Special conditions. Under certain circumstances, such as when excessive quantities of dirt or debris are known to have entered the pipeline, the College's Representative may elect to collect bacteriological samples after allowing the water to stand in the new pipeline for at least 16 hours after final flushing has been completed.

3.4 REDISINFECTION

- A. If the initial disinfection fails to produce satisfactory bacteriological results, the new pipeline may be reflashed and resampled. If the check samples also fail to produce acceptable results, the pipeline shall be rechlorinated by the continuous-feed method until satisfactory results are obtained. Reflashing, resampling, and rechlorination shall be at no expense to the College.

3.5 APPROVAL

- A. Conditional Approval. After satisfactory completion of the disinfection procedure, the College's Representative may issue a conditional approval for immediate use of the water distribution system pending results of bacteriological analysis of water samples.
- B. Final Approval. Upon receipt of laboratory confirmation that all samples are negative for coliform bacteria, the system will be approved for immediate use.

END OF SECTION 33 13 00

SECTION 33 31 00
SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Sanitary sewer piping, material, fittings, and accessories for gravity lines.
- B. Connection of site sanitary sewer system to existing sanitary sewer system.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 01 45 00 Quality Control
- C. Section 31 23 33 Trenching and Backfilling
- D. Section 33 05 26 Utility Signs, Markers, and Flags
- E. Section 33 08 30 Commissioning of Sanitary Sewer Utilities
- F. Section 33 39 23 Sanitary Sewerage Cleanouts

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- B. ASTM D2241 - Standard Specification for PolyVinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
- C. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- D. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- E. ASTM D3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- F. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- G. American Water Works Association (AWWA) C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems
- H. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- I. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water
- J. AWWA C153/A21.53 - Ductile-Iron Compact Fittings for Water Service
- K. "Greenbook" Standard Specifications for Public Works Construction, 2006 Edition
- L. State of California, Department of Health Services, "Criteria for the Separation of Water and Sanitary Sewer."
- M. UPC, Uniform Plumbing Code, current edition

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standard referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents:
 - 1. Record location of pipe runs, connections, manholes and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 - PRODUCTS

2.1 PVC PIPE, PIPING 12 INCHES AND UNDER

- A. Pipe: PVC pipe shall be bell-and-spigot type conforming to ASTM D3034, Type PSM, SDR 35 of materials specified in ASTM D1784, Class 12454 or 12364. Bells shall be integral with pipe. Spigot end pipe with separate double hub couplings is not acceptable. Type PSM, SDR 26 PVC pipe and fittings conforming to ASTM D3034 shall be utilized for piping larger than 12 inches in diameter, piping installed deeper than 15 feet, or piping installed in close proximity to domestic water lines as specified in Section 33 31 00, Part 3.1K. High-Density Polyethylene (HDPE) is not an acceptable product and will not be considered for product substitution.
- B. Joints: Joints shall be PVC specified in ASTM D3212, elastomeric joints using elastomeric seals complying with ASTM F477.
- C. Fittings: SDR 35 PVC conforming D3034 for PSM type, ASTM D2241, and ASTM D1784, Class 12454 or 12364. The strength class of fittings shall no be less than the strength class of any adjoining pipe.

2.2 DUCTILE IRON PIPE

- A. Pipe: DIP pipe shall be Class 50 AWWA C151 with hub and spigot ends. Pipe shall be furnished in minimum standard lengths of 20 feet.
- B. Joints: DIP with elastomeric rubber ring joints conforming to AWWA C111 for push-on or mechanical joints
- C. Fittings: Fittings shall be ductile iron pipe conforming to AWWA C153, size 3 through 24 inch, and AWWA C110 greater than 24 inch, and shall be 350 psi working pressure rated. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.

2.3 ACCESSORIES

- A. Cleanouts shall be as indicated on the Drawings and as specified in Section 33 39 23 Sanitary Sewerage Cleanouts.
- B. Line Marker shall be as specified in Section 33 05 26 Utility Line Signs, Markers, and Flags.
- C. All ductile iron pipe and fittings shall be wrapped in polyethylene per AWWA C105.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.
- B. Follow manufacturer instructions, where such are provided, in all cases that cover points not shown on the Drawings or specified herein. Manufacturer's instructions do not take precedence over the Drawings and Specifications. Where manufacturer's instructions are in conflict with the Drawings and Specification, submit the conflicting instructions to the College's Representative for clarification before performing the work.
- C. Minimum cover over pipe shall be 3 feet from top of pipe to finished grade, unless otherwise noted.
- D. Bedding and cover shall be as specified in Section 31 23 33 Trenching and Backfilling.
- E. Hand trim excavation for accurate placement of pipe to elevations indicated.
- F. Immediately before placing pipe in final position and joining, check bedding for confirmation to specification requirements. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.
- G. Pipe and accessories shall be inspected for defects prior to lowering into trench. Any defective, damaged, or unsound pipe shall be replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Install PVC pipe, fittings, and accessories in accordance with ASTM D2321 and manufacturer's instructions.
- H. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet. The slope shall be smooth.
- I. Install continuous line marker above top of pipe as specified in Section 33 05 26, Utility Line Signs, Markers and Flags.
- J. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.
- K. Maintain proper separation between potable water lines as specified in the State of California, Department of Public Health, "Criteria for the Separation of Water and Sanitary Sewer."
- L. Do not lower any pipe or fitting into a trench that contains water. Pump water from wet trenches, and keep the trenches dry until the joints have been completed and the open ends of the pipes have been closed with watertight plugs or bulkheads. Do not remove the plug or bulkhead unless the trench is dry.
- M. Installation shall comply with Storm Pollution Prevention Plan requirements.
- N. Each pipe-compression-type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. At this time, a thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used. The end of the pipe shall then be forced into the ring to complete the joint. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.

3.2 CONNECTIONS TO EXISTING SEWER MAIN

- A. Utility interruption shall be in accordance with Campus work restrictions.
- B. Where laterals are the same size as the main, connection must be made with a manhole. Use a wye for all other lateral connections except for lateral connections to existing mains 12 inches and larger.
- C. For lateral connections to existing mains 12 inches and larger, use taps and saddles per details.
- D. Take care while making tap connections to prevent concrete or debris from entering existing pipe or structure. Remove debris, concrete, or other extraneous material, which may accumulate.

3.3 CLEANING AND FLUSHING

- A. All sewer lines shall be tested for obstructions and cleaned by a method that shall be approved by the College's Representative. Clean interior of pipe by flushing if required to remove collected debris. Any obstructions or irregularities shall be removed or repaired by the Contractor. All testing, cleaning, and repairing shall be done to the satisfaction of the College's Representative. The Contractor shall dispose of all waste, including water, at no additional expense to College. The water shall not be allowed to enter existing storm drain or sanitary sewer systems without the prior approval of the College's Representative.
- B. The entire piping system shall be thoroughly flushed out until acceptance of the College's Representative. All tests shall be conducted at such times as directed by and in the presence of the College's Representative.
- C. For piping greater than 6 inches and any main piping, clean pipe shall be tested by propelling a snug fitting inflated rubber ball through the pipe with water to remove any debris.
- D. For piping 6 inches and smaller, flush piping applying full size pipe flushing.

3.4 TESTING

- A. Leak Testing: Testing shall be performed after completion of all underground work and shall be successfully completed prior to commissioning (placing in service) any portion of the sewer system. The program of testing must fit the condition as mutually determined by the College's Representative and the Contractor. The Contractor shall take all necessary precautions to prevent any joints from drawing while the pipelines or their appurtenances are being tested. Contractor shall, at no additional cost to College, correct any excess leakage and repair any damage to the pipe and its appurtenances or to any structure indicated by or resulting from these tests.
 - 1. Water exfiltration testing shall be conducted between two consecutive manholes. The lower end of the pipe to be tested shall be plugged as well as the inlet sewer of the upper manhole.
 - 2. The hydrostatic head for test purposes shall be at least 4 feet above the water table and crown of pipe at the upstream manhole. In every case, the height of the water table at the time of the test shall be determined by exploratory holes or such other methods approved by the College's Representative. The College's Representative shall make the final decisions regarding test height for the water in the pipe section being tested. The length of pipe tested by exfiltration shall be limited so that the pressure on the invert of the lower end of the section shall not exceed 20-feet of water column.
 - 3. Pipe and joints shall sustain a maximum leakage limit of 250 gallons per inch pipe diameter per mile per 24 hours, as measured over a period of 30 minutes minimum.

4. All sewer lateral connection footage included in the test section and subjected to minimum head specified shall be taken into account in computing allowable leakage.
 5. Dispose of test water in a manner that will not damage or interfere with adjacent property and in a manner acceptable with the College's Representative and all regulatory agencies.
 6. Even though the test for leakage is within the prescribed limits, the Contractor shall repair any obvious leaks.
 7. Manholes are tested separately as specified in Section 33 05 13, Manholes and Structures.
- B. Low pressure air testing may be used in lieu of water exfiltration testing for pipelines 12 inches in diameter and smaller when approved in advance by the College's Representative. The following procedure shall be used for air testing:
1. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
 2. If the pipe to be tested is submerged in ground water, insert a pipe probe, by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.
 3. Add air slowly to the portion of the pipe installation under test until the internal pressure is raised to 5.0 psig.
 4. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any leakage is observed, bleed off air and make necessary repairs.
 5. After an internal pressure of 5.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
 6. After the two minute period, disconnect the air supply and start stopwatch. The pressure of 5.0 psig shall be maintained for 5 minutes.
 7. As an alternative, the Contractor may request the air testing procedure as presented in Section 306-1.4.4 of the 2006 edition of the "Greenbook" Standard Specifications.
 8. Adjust air pressure requirements if ground water table is above the sewer line being tested. An increase of 0.433 psi for each foot the ground water level is above the invert of the pipe shall be applied.
- C. Deflection Testing shall be conducted by the Contractor for PVC SDR 35 pipe 6 inches in diameter and larger. Deflection testing is not required for PVC SDR 26 or DIP piping.
1. After pipe installation and not less than 30 days after completion of the trench backfill, but prior to placement of pavement, PVC SDR 35 pipe shall be cleaned and mandrel tested for obstructions such as, but not limited to, deflections, joint offsets, and lateral pipe intrusions.
 2. A rigid mandrel shall be pulled through the pipe by hand. Mechanical pulling device will not be allowed. The mandrel shall be rigid, nonadjustable and having an effective length of not less than its nominal interior diameter of the pipe being tested. The outside diameter of the mandrel shall be, at a minimum, 95 percent of the inside diameter of the pipe being tested after debeading.
 3. Mandrel shall be pulled through each run of installed pipe in the presence of College's Representative. If the mandrel is caught in the pipe and cannot be pulled completely through, the section of pipe where the mandrel is caught is deemed defective.

4. All obstructions encountered by the mandrel shall be corrected by the Contractor. Obstructions due to deflection shall be corrected by replacement of the over-deflected pipe. Mechanical re-rounding is not permitted.
 5. If a section of pipe fails to meet the mandrel test and is reinstalled and fails a second time, said section(s) of pipe shall be replaced with rigid pipe material approved by the College's Representative.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no additional cost to College.
 - E. All tests shall be witnessed by the College's Representative. At least 48 hours notice of tests shall be given.
 - F. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.

3.5 COMMISSIONING

- A. Prior to putting a sewer line in service, the Contractor shall conduct an acceptance checklist as required in Section 33 08 30 Commissioning of Sanitary Sewer Utilities.

END OF SECTION 33 31 00

SECTION 33 39 23
SANITARY UTILITY SEWERAGE CLEANOUTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Sewerage cleanout requirements and access.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 01 45 00 Quality Control
- C. Section 31 23 33 Trenching and Backfilling
- D. Section 33 31 00 Sanitary Utility Sewerage Piping

1.3 REFERENCES

- A. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures

1.4 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standard referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents:
 - 1. Record location of cleanouts and invert elevations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

- A. Cleanouts shall be as indicated on Drawings and shall comply with details.
- B. Cleanout components shall be the same size and same pipe material as the lateral and shall be a pipe extension to grade with compression plug.
- C. Curb box shall be over the riser pipe. A precast concrete box, Christy F8, with cast iron lid or equal shall be used in non-traffic areas. A Christy G5 concrete box with cast iron lid or equal shall be used in traffic areas. Lids shall be marked "SEWER."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall comply with ASTM C891 and as detailed, Service Lateral and Cleanout.
- B. Bedding and Cover shall be as specified in Section 31 23 33 Trenching and Backfilling.
- C. Cleanouts shall be installed 18 inches from face of curb or 12 inches maximum behind sidewalk. Where service is in a driveway, install cleanout 18 inches behind apron.
- D. In cases where the cleanout installation conflicts with existing facilities, the Contractor shall verify in writing any alternative location with the College's Representative prior to installation.
- E. Placement of cleanout in concrete box shall be vertical and centered in the box.

3.2 TESTING

- A. Testing shall conform to the testing requirements in Section 33 31 00 Sanitary Utility Sewerage Piping.
- B. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.

END OF SECTION 33 39 23

SECTION 33 41 00
STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Storm drainage piping, fittings, and accessories (gravity systems only).
- B. Connection of drainage system to existing drainage system.
- C. Inlets and Cleanouts.

1.2 RELATED SECTIONS

- A. Section 01 33 00 Submittals
- B. Section 31 23 33 Trenching and Backfilling
- C. Section 33 05 13 Manholes and Structures
- D. Section 33 05 26 Utility Line Signs, Markers, and Flags

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) A 746 - Standard Specification for Ductile Iron Gravity Sewer Pipe; 2003.
- B. ASTM D 3034 - Standard Specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings; 2004a.
- C. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2005.
- D. ASTM F 2306 - Standard Specification for Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
- E. American Water Works Association (AWWA) C111/A21.11 – American National Standard for Rubber Gasket Joints For Cast Iron and Ductile Iron Pressure Pipe and Fittings; 2000.

1.4 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.5 SUBMITTALS

- A. See Section 01 33 00 Submittals for submittal procedures.
- B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Samples:

1. Drain Pipe: One (1) twelve (12) in. length for each type.
2. Area Drain: One (1) for each type and finish.
3. Filter Fabric: Six (6) in. x Six (6) in.

PART 2 - PRODUCTS

2.1 DRAINAGE PIPE MATERIALS

- A. Plastic Pipe:
 1. ASTM D 3034, Type PSM, SDR 26, SDR 35, Poly Vinyl Chloride (PVC) material; inside nominal diameter as indicated on Drawings.
 2. ASTM F 2306, high-density polyethylene (HDPE) material; inside nominal diameter as indicated on Drawings.
- B. Plastic Pipe Joint Seals: ASTM D 3212 PVC elastomeric joints using elastomeric seals complying with ASTM F 477.
- C. Ductile Iron Pipe: A 746; inside nominal diameter as indicated on Drawings.
- D. Ductile Iron Pipe Joint Seals: AWWA C111/A21.11 rubber gaskets.
- E. Corrugated High Density Polyethylene Pipe (CPEP): Pipe shall have a smooth interior and annular exterior corrugations. Pipe and fitting material shall be high density polyethylene meeting ASTM D3350 minimum cell classification 324420C for 4-10 inches diameters or 335420C for 12-60 inches diameters. Pipes 4-10 inches in diameter shall meet American Association of State Transportation Officials (AASHTO) M252, Type S, and 12-48 inches diameter shall meet AASHTO M294, Type S. Pipe material shall be a slow crack resistance material evaluated using the single point notched constant tensile load (SP-NCTL) test. Average SP-NCTL test specimens must exceed 24 hours with no test result less than 17 hours.
- F. Perforated and Non-Perforated Polyethylene Tubing:
 1. Type: ASTM F405 corrugated tubing and fittings, for less than 10 in. diameter, and ASTM F667 for 10 in., 12 in. and 15 in. diameters.
 2. Manufacturer: Advanced Drainage Systems, Inc., [800] 742-1933.
 3. OR – Perforated and Non-Perforated Polyvinyl Chloride Pipe [PVC]:
 4. Type: ASTM D1785, PVC 1120-1220, Schedule 40, pipes and fittings.
 5. Perforations: 3/8 in. diameter, 4 in. apart center to center longitudinally, in two rows 120 degrees apart..
 6. Manufacturer: Lasco, [714] 991-1220.
- G. Corrugated High Density Polyethylene Pipe (CPEP) Joint Device: Bell-and-spigot meeting AASHTO M252, AASHTO M294 or MP7. Joints shall be silt-tight and non-rated watertight. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477 with the addition that the gaskets shall not have any visible cracking when tested according to ASTM D1149 after 72-hour exposure in 50 PPHM ozone at 104 degrees F.
- H. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.2 PIPE ACCESSORIES

- A. Line Marker: Provide line markers in accordance with Section 33 05 26 Utility Line Signs, Markers, and Flags

2.3 CLEANOUTS AND CATCH BASINS

- A. Cleanouts and Catch Basins: As indicated on Drawings.

2.4 BEDDING AND COVER MATERIALS

- A. Pipe Bedding Material: As specified in Section 31 23 33 Trenching and Backfilling.
- B. Pipe Cover Material: As specified in Section 31 23 33 Trenching and Backfilling.

2.5 ACCESSORIES

- A. Drain Rock:
 1. Description: Clean, coarse sand and gravel or crushed stone free from injurious materials or soil and all deleterious chemicals.
 2. Physical Properties:

<u>Percentage Passing</u>	<u>Sieve Size</u>
100	2 in
70-100	3/4 in
40-100	3/8 in
25-50	#4
15-35	#8
5-18	#30
0-10	#50
0-3	#200

- B. Backfill for Sub-Drains: Clean selected excavated material from the site or from off-site borrow areas.
- C. Clean Sand at Retention Basin and Cobble Swale:
 1. Physical Properties (by dry weight basis):

<u>Percentage Passing</u>	<u>Sieve Size</u>
100	4.76 mm (#4, 4 mesh)
95-100	1.00 mm (#18, 16 mesh)
65-100	500 micron (#35, 32 mesh)
0-50	250 micron (#60, 60 mesh)
0-20	105 micron (#140, 150 mesh)
0-5	535 micron (#270, 270 mesh)

- D. Filter Fabric:
 1. "Mirafi 140S" by Mirafi, Inc., (800) 438-1855
 2. "Supac 4NP" by Philips Fibers Corporation and distributed by Pacific Corrugated Pipe (415) 489-4711.
 3. "Poly Filter X" by Carthage Mills, Inc., (513) 242-2740

4. Use only one brand for the entire project.

PART 3 - EXECUTION

3.1 TRENCHING

- A. See Section 31 23 33 Trenching and Backfilling for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.2 INSTALLATION - PIPE

- A. Lay piping beginning at low point of system, true to grades and alignment indicated on Drawings, with unbroken continuity of invert.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
 1. Plastic Pipe: Also comply with ASTM D 2321.
- C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- D. Install continuous line marker 18 inches above top of pipe; coordinate with Section 31 23 33 Trenching and Backfilling.

3.3 SUB DRAINAGE SYSTEM

- A. Preparation of French Drain: Accurately excavate trench drain
- B. Filter Fabric: Place Fabric in bottom of trench and extend up sides and beyond trench. Overlap 12 in. at ends of roll.
- C. Drain rock and pipe: Install bedding portion of drain rock and bed pipe in place. Do not damage or displace filter fabric.
- D. Review: Prior to installing remaining drain rock backfill, request review by Landscape Architect / Civil Engineer for progress of work.
- E. Closing: Upon acceptance, add remaining drain rock and lap over the ends of the filter fabric as shown on the Drawings.
- F. Soil Backfill: Backfill to a minimum depth of 6 in. above filter fabric as shown on the Drawings.

3.4 INSTALLATION - CATCH BASINS

- A. Provide as recommended by manufacturer.

3.5 PIPE PENETRATIONS

- A. For pipe penetrations through existing manholes, core through, provide gasket around pipe, grout penetration on both sides and provide a minimum of 6 inches around collar outside of the manhole or inlet structure penetration.

3.6 TAP CONNECTIONS

- A. Make connections to existing piping and underground structures so that finished Work will conform as nearly as practicable to requirements specified for new Work.
- B. Into underground structures or pipes 24 inches and larger: Cut opening into unit sufficiently large to allow 3 inches of concrete to be packed around entering connection. Cut ends of connection passing through pipe or structure wall to conform to shape of and be flush with inside wall. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground. Provide 3000 pounds per square inch concrete. Use epoxy bonding compound as interface between new and existing concrete and piping materials.
- C. Take care while making tap connections to prevent concrete or debris from entering existing pipe or structure. Remove debris, concrete, or other extraneous material, which may accumulate.

3.7 CLEANING

- A. Piping greater than 6 inches: clean pipe to be tested by propelling a snug fitting inflated rubber ball through the pipe with water to remove any debris.
- B. Piping 6 inches and smaller: flush piping applying full size pipe flushing.

3.8 LEAK TESTING

- A. Testing of all portions of the sewer including manholes is required.
- B. For either exfiltration or infiltration test, the maximum leakage shall not exceed 250 gallons per inch of pipe diameter per mile per 24 hours as measured over a period of 30 minutes minimum. Should the leakage exceed the maximum allowable rate, the contractor shall repair, overhaul, or rebuild the defective portion of the sewer line. After repairs have been completed by the Contractor, the line shall be retested as specified above.
- C. Manholes shall be filled with water to the rim of the frame casting and shall lose no more than 2 inches over a period of 30 minutes.
- D. The final test shall be performed after the line has been laid and all backfill placed and compacted. The Contractor, at Contractor's option, may test the line at any time during construction. However, the final test for acceptance shall be made only after all backfill is in place and compacted. In the event that the exfiltration test prescribed above is impractical due to wet trench conditions, these portions of the sewer line where such conditions are encountered will be tested for infiltration. The College's Representative shall determine whether the exfiltration or infiltration test will be used.
- E. Even though the test for leakage is within the prescribed limits, the Contractor shall repair any obvious leaks.
- F. Low pressure air testing may be used in lieu of water testing at the option of the Contractor. Water testing may be required by the College's Representative. The following procedure shall be used for air testing:
 - 1. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
 - 2. If the pipe to be tested is submerged in ground water, insert a pipe probe, by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.

3. Add air slowly to the portion of the pipe installation under test until the internal pressure is raised to 5.0 psig.
4. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any leakage is observed, bleed off air and make necessary repairs.
5. After an internal pressure of 5.0 psig. is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
6. After the two minute period, disconnect the air supply and start stopwatch. The pressure of 5.0 psig. shall be maintained for 5 minutes.
7. As an alternate, the contractor may request the air testing procedure as presented in Section 306-1.4.4 of the 1997 edition of the "Greenbook" Standard Specifications.

3.9 PROTECTION

- A. General: Keep clean and protect sub-drainage system until commencement of work under Division 32.
- B. Sediments: Regularly inspect and clean all drain sediment buckets to prevent flooding. Sweep or hose clean all trench drains as necessary.
- C. Sub-Drain: Monitor sub-drainage systems and immediately identify all problems with drainage. Make adjustments as necessary to maintain proper sub-drainage.

END OF SECTION 33 41 00

SECTION 41 22 00
CRANES AND HOISTS

PART 1 GENERAL

The General Provisions of the Contract, including General and Special Conditions and the requirements of Division 1, apply to the Work in this Section.

1.1 WORK INCLUDED

- A. Equipment items as listed below by Equipment Mark Number:
 - 1. 4702, CEILING MOUNTED MONORAIL W/ HOIST, CHAIN HOIST, ELECTRIC, 2 TON
 - 2. 4703, CEILING MOUNTED MONORAIL W/HOIST, CHAIN HOIST, ELECTRIC, 3 TON
 - 3. 4704, CEILING MOUNTED UH BRIDGE CRANE, CHAIN HOIST, ELECTRIC, 3 TON
- B. Related requirements: Roughing-in and installation of equipment with labor, services, and incidentals necessary for complete and operational equipment installation.
- C. Wiring and switching between equipment and utilities.

1.2 QUALITY CONTROL

- A. Experience: Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.
- B. Each crane system identified within shall be engineered as a single system by an identifiable prime manufacturer meeting all the requirements of section 1.03. An assemblage of individual components from various manufacturers without the engineering oversight and approval from an identifiable prime manufacturer will not be accepted.
- C. All cranes to be installed per the most current CMAA / ANSI standards issued by the respective organizations at the time of installation.
- D. Manufacturer's Representative:
 - 1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check-out, and start-up.
 - 2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment.

1.3 STANDARD AND REGULATORY REQUIREMENTS

- A. Equipment indicated within this specification section shall comply with all applicable national, state, and local codes and regulations, including seismic and fire codes and regulations. Additional, more specific compliance requirements may be listed under individual equipment headings.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Submit Product Data in accordance with Division 1 - General Requirements of these specifications.
 2. All Product Data submittals shall identify proposed project specific items marked by arrow, circle, underline, reproducible highlight, or other markings clearly discernable by the reviewer, to show which specific items, parts and accessories are being submitted for the project product data review. Non-marked or generic product data submittals with no marks indicating specific items, parts and accessories will be a cause for rejection.
 3. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.
- B. Operation and Maintenance Manual:
1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:
 - (a) Description of system and components.
 - (b) Schematic diagrams of electrical and compressed air systems.
 - (c) Manufacturer's printed operating and maintenance instructions.
 - (d) List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.
 2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 - General Requirements.
- C. Shop Drawings: Submit in accordance with Division 1 -General Requirements of these specifications.
1. Submitted shop drawings shall be project specific and shall include a minimum 1/8 inch to 1 foot scaled (or larger standard architectural imperial scale), dimensioned, graphical representation of the size, orientation, and location for the submitted equipment. The drawings shall further include dimensions from structural elements or architectural grid lines, operational clearances, locations of any utility service connection points, mounting requirements, and structural supports required for the submitted equipment.
- D. Buy America Certificates: Buy America certificates required during bidding shall also be required as part of each product submittal. Certificates shall be complete and accurate. Certificates shall indicate either compliance or non-compliance with the Buy America regulations. Certificates of non-compliance shall also include copies of any granted waivers. Waivers still being applied for or being processed at the time of submittal shall be indicated as such.

1.5 PRODUCT SUBSTITUTIONS

- A. Follow requirements specified in Division 1 - General Requirements.
- B. Additional costs resulting from substitution of products other than those specified, including drawing changes and construction will be at the expense of the Contractor.
- C. Substitution Approval: Manufacturers listed for each equipment item may bid without

submittal for that item. Manufacturers not listed shall submit for approval in accordance with "Instructions to Bidders". Prior to installation, submittals for each equipment item by Mark Number shall be provided in accordance with Division 1 - General Requirements.

1.6 WARRANTY

- A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship.
- B. Warranty shall include materials and labor necessary to correct defects.
- C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.
- D. Submit warranties in accordance with Division 1 - General Requirements of these specifications.
- E. All parts shall be readily available locally in the United States.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.
- B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.
- C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.8 LABELING

- A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate showing manufacturer's name, address, model number, serial number, and pertinent utility or operating data.
- B. Crane capacity shall be painted with letters and numbers 3 inches high minimum on both sides of the main structural assembly.
- C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 – PRODUCTS

2.1 CEILING MOUNTED WORKSTATION MONORAIL SYSTEM W/HOIST, CHAIN, ELECTRIC, 2T

- A. Equipment Identifier: 4702
- B. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction:
 - a. Gorbel
600 Fishers Run
Fishers, NY 14453
Tel: (585)-924-6262
Gorbel Monorail Model No.: GLMS4000-23
Gorbel Hoist Model No: 94552
2. Alternate manufacturers: Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers may be considered as equal.

C. Capacities/Dimensions:

1. Hoist:
 - a. Capacity: 4000 pounds.
 - b. Lifting Range: 20 feet.
 - c. Lifting Speeds 16/4 FPM.
 - d. Motor: 1 HP.
2. Headroom, with trolley: 20.25 inches, maximum
3. Weight: 145 pounds, nominal

D. Features/Performance/Construction:

1. Drive: MANUAL PUSH PULL BRIDGE CRANE
2. Frame and wheels: Enclosed Track runways & bridge..
3. Load hook and chain: Forged steel hook with safety clip attached to heat treated chain by bearing type swivels.
4. Safety features: factory preset load limit slip clutch to prevent overloading and motor overheating, and adjustable upper and lower limit switches.
5. Hoist mounting: Clevis mounted to enclosed track trolley.
6. Pendant height: Control pendant shall be mounted 48 inches above finished floor.

E. Controls: Four pushbutton pendant, 24 volt, with cord strain relief bushings for hoist UP/DOWN and trolley FORWARD/REVERSE.

F. Accessories:

1. Electrification kit: flat cable festooning system, and power cable configured for use with overhead monorail beam indicated in the drawings, one each.
2. Hoist mounted chain container kit, one each.

G. Utility Requirements

1. Electrical Connection Requirements
 - a. Voltage: 460 VAC
 - b. Phase: 3
 - c. HP: 1
 - d. Amps: 10 FLA

2.2 CEILING MOUNTED MONORAIL W/HOIST, CHAIN, ELECTRIC, 3 TON

A. Equipment Identifier: 4703

B. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction:
 - a. CLEVELAND TRAMRAIL by Gorbel
600 Fishers Run
Fishers, NY 14453
Tel: (585)-924-6262
Cleveland Tramrail Model No.: 5400 SERIES Cleveland Tramrail
2. Alternate manufacturers: Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers may be considered as equal.

C. Capacities/Dimensions:

1. Hoist:
 - a. Capacity: 6000 pounds.
 - b. Lifting Range: 20 feet.
 - c. Lifting Speeds: 17/3 FPM.
 - d. Trolley Speeds: 80/13 FPM
 - e. Hoist Motor: 4.7 HP.
 - f. Trolley Motor: .54 HP
2. Headroom, with trolley 32.9 inches, maximum

D. Features/Performance/Construction:

1. Drive: Needle and ball type bearings with gears running in oil bath.
2. Patent track runways and bridge. Engineered beams with hardened 3.25" width flat running surface.
3. Frame and wheels: Cast aluminum alloy with steel wheels.
4. Load hook and chain: Forged steel hook with safety clip attached to heat treated chain by bearing type swivels.
5. Safety features: Ratchet pawl mechanical load brake, factory preset load limit slip clutch to prevent overloading and motor overheating, and adjustable upper and lower limit switches.

6. Hoist mounting: Lug mounted to trolley for minimum headroom.
 7. Pendant height: Control pendant shall be mounted 48 inches above finished floor.
- E. Controls: 4 pushbutton pendant, 120 volt, with cord strain relief bushings for hoist UP/DOWN and trolley FORWARD/REVERSE.
- F. Accessories:
1. Flat cable festooning system, and power cable.
 2. Independent C-Track for Pushbutton Pendant.
 3. Hoist mounted chain container kit, one each.
- G. Utility Requirements
1. Electrical Connection Requirements
 - a. Voltage: 460VAC
 - b. Phase: 3
 - c. HP: 5.4
 - d. Amps: 15 FLA

2.3 BRIDGE CRANE, UNDERRUNNING W/HOIST, CHAIN, ELECTRIC, 3 TON

- A. Equipment Identifier: 4704
- B. Manufacturer's Reference:
1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction:
 - a. CLEVELAND TRAMRAIL by Gorbel
 - b. 600 Fishers Run
Fishers, NY 14453
Tel: (585)-924-6262
Cleveland Tramrail Model No: CT-CM-20-H3-47-102
 2. Alternate manufacturers: Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers may be considered as equal.
- C. Capacities/Dimensions:
1. Hoist:
 - a. Capacity: 6000 pounds.
 - b. Lifting Range: 20 feet.

- c. Lifting Speeds: 17/3 FPM.
 - d. Trolley Speeds: 80/13 FPM
 - e. Hoist Motor: 4.7 HP.
 - f. Trolley Motor: .54 HP
2. Headroom, with trolley: 32.9 inches, maximum
- D. Features/Performance/Construction:
1. Drive: Needle and ball type bearings with gears running in oil bath.
 2. Patent track runways and bridge. Engineered beams with hardened 3.25" width flat running surface
 3. Frame and wheels: Cast aluminum alloy with steel wheels.
 4. Load hook and chain: Forged steel hook with safety clip attached to heat treated chain by bearing type swivels.
 5. Safety features: Ratchet pawl mechanical load brake, factory preset load limit slip clutch to prevent overloading and motor overheating, and adjustable upper and lower limit switches.
 6. Hoist mounting: Lug mounted to trolley for minimum headroom.
 7. Pendant height: Control pendant shall be mounted 48 inches above finished floor.
- E. Controls: Six pushbutton pendant, 120 volt, with cord strain relief bushings for hoist UP/DOWN, trolley FORWARD/REVERSE, and bridge FORWARD/REVERSE.
- F. Accessories:
1. Electrification kit: Conductor Bar (4 bar) for the runway w/Collector arm, flat cable festooning system, and power cable configured for use with overhead bridge beam indicated in the drawings, one each.
 2. Independent C-Track for Pushbutton Pendant.
 3. Hoist mounted chain container kit, one each.
3. Utility Requirements
1. Electrical Connection Requirements
 - a. Voltage: 460 VAC
 - b. Phase: 3
 - c. HP: 5.25
 - d. Amps: 30 FLA

PART 3 - EXECUTION

3.1 INSPECTION

- A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.

- B. Inspect delivered equipment for damage from shipping and exposure to weather. Compare delivered equipment with packing lists and specifications to assure receipt of all items.

3.2 INSTALLATION

- A. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Engineer.
- B. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:
 - 1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level, plumb and at right angles to adjacent work.
 - 2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
 - 3. Anchorage: Attach equipment securely to floor, per manufacturer's instructions and as directed, specified, or detailed by the Structural Engineer for general anchorage and seismic bracing conditions, to prevent damage resulting from inadequate fastening. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.
 - 4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.3 TESTING

- A. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with specification in the presence of the Engineer using acceptance procedures provided by the manufacturer.
- B. Final testing and post installation inspection are required, and shall be performed by the manufacturer or the manufacturer's designated representative only. Final testing and inspection shall not be performed by the installer, unless the installer is also the manufacturer.

3.4 CLEANUP

- A. Touch-up damage to painted finishes.
- B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.
- C. Clean area around equipment installation and remove packing or installation debris from job site.
- D. Notify Engineer for acceptance inspection.

3.5 TRAINING

- A. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.
 - 1. Equipment Mark Numbers: 4702, 4703, 4704
Hours Required: 2
- B. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

- C. Provide a Windows compatible movie file format recording on DVD disk of the training session. The DVD training movie can be of a live session or a produced training video.

END OF SECTION

Project Specific Abatement Specifications Building B Demolition Project

College of Alameda - 555 Ralph Appezato Memorial Parkway
Alameda, California

Prepared for

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333 East Eight Street
Oakland, California 94606

Prepared by

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Contents

Acronyms and Abbreviations.....	viii
Signatures	x
Executive Summary.....	xi
SECTION 00100 EXISTING CONDITIONS.....	1
PART 1 - GENERAL INFORMATION	1
1.1 BACKGROUND.....	1
1.2 SITE LOCATION.....	1
1.3 CONTACT INFORMATION	1
1.4 SUMMARY OF EXISTING CONDITIONS.....	2
PART 2 - PRODUCTS (Not Used)	4
PART 3 - EXECUTION (Not Used)	4
SECTION 00200 SUMMARY OF WORK	5
PART 1 - GENERAL	5
1.1 INTENT	5
1.2 WORK SPECIFIED.....	5
1.3 QUANTITIES AND MEASUREMENTS	5
PART 2 - PRODUCTS.....	6
2.1 MATERIALS AND EQUIPMENT	6
PART 3 - EXECUTION.....	6
3.1 SCHEDULING, COORDINATION AND AREAS AVAILABLE TO CONTRACTOR.....	6
3.2 CONTRACT DRAWINGS.....	6
3.3 SUMMARY OF WORK.....	6
3.4 STRUCTURES TO BE PROTECTED	7
SECTION 00300 TECHNICAL INFORMATION	8
PART 1 - GENERAL	8
1.1 DEFINITIONS	8
1.2 FAMILIARIZATION WITH THE WORK.....	8
1.3 SITE ACCESS AND AREAS AVAILABLE TO THE CONTRACTOR.....	8
1.4 USE OF SPECIFIED EQUIPMENT AND MATERIALS.....	9
1.5 UTILITIES	9
1.6 TESTING AND INSPECTIONS.....	9
1.7 INDIRECT COSTS.....	9
1.8 QUALIFICATIONS.....	9
1.9 START AND COMPLETION OF THE WORK.....	10



1.10	BID DUE DATE AND TIME.....	10
1.11	SUBMITTALS WITH THE BID.....	10
1.12	SUBMITTALS AFTER AWARD.....	11
PART 2 - PRODUCTS (Not Used)		11
PART 3 - EXECUTION (Not Used)		11
SECTION 00400 BID FORMS		13
PART 1 - GENERAL		13
1.1	BID FORMS.....	13
PART 2 - products (Not Used).....		16
PART 3 - execution (not used)		16
SECTION 00700 GENERAL CONDITIONS.....		17
PART 1 - general		17
1.1	definitions.....	17
1.2	RELATED DOCUMENTS	19
1.3	ROLES AND RESPONSIBILITIES	20
1.4	COMMUNICATIONS	21
1.5	EMERGENCIES.....	21
1.6	PERMITS.....	21
1.7	CONTRACT DOCUMENTS: INTENT	22
1.8	AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS	22
1.9	CHANGES IN THE WORK	22
1.10	MINOR VARIATIONS IN THE WORK	23
1.11	CONTRACT DOCUMENTS: REUSE OF DOCUMENTS.....	23
1.12	BEFORE STARTING FIELD WORK	23
1.13	SAFETY SUPERVISOR.....	24
1.14	USE OF PREMISES	24
1.15	PROTECTION OF EXISTING FEATURES	24
1.16	UNDERGROUND FACILITIES.....	25
1.17	MANAGEMENT OF WASTE	25
1.18	EROSION AND SEDIMENTATION CONTROL.....	26
1.19	SCHEDULE OF VALUES	26
1.20	CHANGES IN CONTRACT PRICE	26
1.21	APPLICATION FOR PROGRESS PAYMENT.....	27
1.22	FINAL INSPECTION	28
1.23	REJECTING DEFECTIVE WORK	28
1.24	FINAL PAYMENT AND ACCEPTANCE	28
1.25	WAIVER OF CLAIMS	28



PART 2 - PRODUCTS (Not Used)	28
PART 3 - EXECUTION (Not Used)	28
SECTION 00900 HEALTH AND SAFETY.....	29
PART 1 - general	29
1.1 related documents	29
1.2 HEALTH AND SAFETY – ADDITIONAL REQUIREMENTS	29
1.3 SUBMITTALS	33
1.4 WORK PERMIT PROGRAM	33
1.5 EQUIPMENT	34
1.6 EQUIPMENT FUELING	35
PART 2 - PRODUCTS (Not Used)	36
PART 3 - EXECUTION (Not Used)	36
SECTION 00910 PROJECT MEETINGS	37
PART 1 - general	37
1.1 work specified.....	37
1.2 PROJECT ORIENTATION MEETING	37
1.3 WEEKLY PROGRESS MEETINGS.....	37
1.4 DAILY SAFETY MEETINGS.....	37
1.5 PROJECT CLOSEOUT MEETING	37
1.6 OTHER MEETINGS.....	37
PART 2 - PRODUCTS (Not Used)	38
PART 3 - EXECUTION (Not Used)	38
SECTION 01000 MOBILIZATION/DEMOBILIZATION	39
PART 1 - general	39
1.1 WORK SPECIFIED.....	39
PART 2 - PRODUCTS.....	39
2.1 MATERIALS AND EQUIPMENT	39
PART 3 - EXECUTION.....	39
3.1 MOBILIZATION.....	39
3.2 DEMOBILIZATION	40
SECTION 01010 TEMPORARY SERVICES	42
PART 1 - general	42
1.1 work specified.....	42
PART 2 - PRODUCTS.....	43
2.1 MATERIALS AND EQUIPMENT	43
PART 3 - EXECUTION (Not used).....	43
SECTION 01100 ASBESTOS ABATEMENT.....	44



PART 1 - general	44
1.1 DEFINITIONS	44
1.2 RELATED WORK	44
1.3 REFERENCES.....	45
1.4 QUALIFICATIONS.....	45
1.5 SUBMITTALS	46
1.6 DESCRIPTION OF WORK.....	47
PART 2 - PRODUCTS.....	48
2.1 MATERIALS AND EQUIPMENT	48
2.2 CONTAINERS.....	48
PART 3 - EXECUTION.....	48
3.1 GENERAL REQUIREMENTS.....	48
3.2 QUANTITIES AND MEASUREMENT	48
3.3 PREPARATION	49
3.4 REMOVAL.....	50
3.5 AIR QUALITY MONITORING	52
3.6 QUALITY CONTROL	52
3.7 WASTE TRANSPORTATION AND DISPOSITION	52
SECTION 01110 LOOSE LEAD-CONTAINING PAINT REMOVAL.....	54
PART 1 - general	54
1.1 definitions.....	54
1.2 related work	54
1.3 REFERENCES.....	55
1.4 QUALIFICATIONS.....	55
1.5 WORK SPECIFIED.....	56
1.6 SUBMITTALS	56
PART 2 - PRODUCTS.....	56
2.1 MATERIALS AND EQUIPMENT	56
2.2 CONTAINERS.....	56
PART 3 - EXECUTION.....	57
3.1 PREPARATION	57
3.2 REMOVAL.....	57
3.3 DUST CONTROL.....	58
SECTION 01120 REGULATED PCB ABATEMENT	59
PART 1 - general	59
1.1 work specified.....	59
1.2 RELATED WORK	60



1.3	DEFINITIONS	60
1.4	GENERAL REQUIREMENTS.....	60
1.5	REGULATORY REQUIREMENTS	62
1.6	SUBMITTALS	62
1.7	QUALITY ASSURANCE	63
1.8	COORDINATION	64
PART 2 -	PRODUCTS.....	64
2.1	MATERIALS AND EQUIPMENT	64
PART 3 -	EXECUTION.....	64
3.1	ABATEMENT OF REGULATED PCB CONTAINING MATERIALS.....	64
3.2	WASTE MANAGEMENT.....	67
3.3	WASTE STORAGE	68
3.4	SHIPPING PAPERS	68
3.5	TRANSPORT OF CONTAMINATED MATERIAL	69
3.6	SPILL RESPONSIBILITY	69
3.7	DECONTAMINATION PROCEDURES.....	69
SECTION 01500	WASTE HANDLING, TRANSPORATION, AND DISPOSITION	71
PART 1 -	general	71
1.1	definitions.....	71
1.2	RELATED DOCUMENTS	71
PART 2 -	PRODUCTS (Not Used)	71
PART 3 -	EXECUTION.....	71
3.1	WASTE HANDLING, TRANSPORTATION AND DISPOSITION – GENERAL REQUIREMENTS.....	71
3.2	SHIPPING AND DISPOSAL/RECYCLING DOCUMENTS.....	72
3.3	WASTE TRANSPORTATON.....	72
3.4	WASTE DISPOSAL.....	73



Appendices

- A Hazardous Building Material Survey Report, College of Alameda - Building B



Acronyms and Abbreviations

AA Plans	asbestos abatement plans
ACM	asbestos-containing material
ACCM	asbestos-containing construction material
AQMD	Air Quality Management District
ARC	Asbestos Removal Contractor
CAC	Certified Asbestos Consultant
Cal/OSHA	California Occupational Safety and Health Administration
CDPH	California Department of Public Health
DTSC	Department of Toxic Substances Control
EMR	Experience Modification Rating
Eurofins	Eurofins EMLab P&K Laboratory
RFP	Request for Proposal
Peralta	Peralta Community College District
HEPA	high-efficiency particulate air
HUD	U.S. Department of Housing and Urban Development
LBP	lead-based paint
LCP	lead-containing paint
LOTO	Lock Out/Tag Out
LTIR	Lost Time Incident Rate
NESHAP	National Emissions Standard for Hazardous Air Pollutants
NPES	Negative Pressure Enclosure System
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PG	Professional Geologist
PLM	polarized light microscopy
PLM/DS	PLM with Dispersion Staining
ppm	parts per million
QC	Quality Control
the Site	Building B Demolition Project
Terraphase	Terraphase Engineering Inc.
TRIR	Total Recordable Incident Rate
U.S. EPA	United States Environmental Protection Agency
Wt. %	weight percent





Signatures

The information, conclusions, and recommendations in this document have been reviewed by a California Certified Asbestos Consultant and/or Lead-Related Contractor Inspector/Assessor.



Salvador Mendoza, PG, CAC
Certified Asbestos Consultant, No. 03-3386
CDPH Lead Inspector/Assessor, No. 00000496

February 16, 2021

Date

This specification submittal was reviewed and approved by:



Daren Roth
Associate Geologist, Health and Safety Manager
Certified Site Surveillance Technician, No. 05-3731
Terraphase Engineering Inc.

February 16, 2021

Date

Executive Summary

Terraphase Engineering Inc. (Terraphase) was retained by Peralta Community College District (Peralta) to prepare Project Specific Abatement Specifications for hazardous building materials (asbestos-containing materials [ACMs], lead-based paints [LBPs] or lead-containing paints [LCPs], and polychlorinated biphenyls [PCBs]) associated with Building B located within the College of Alameda Campus in Alameda County, California (Site). These specifications have been developed and are consistent with CSI format going forward. The relative sections can be separated out, as needed. A copy of Terraphase's *Hazardous Building Material Survey Report, College of Alameda - Building B* is included as Attachment A.



SECTION 00100
EXISTING CONDITIONS

PART 1 - GENERAL INFORMATION

1.1 BACKGROUND

A. At the request of Peralta Community College District (Peralta), Terraphase Engineering Inc. (Terraphase) has these project specific abatement specifications for hazardous building materials (asbestos-containing materials [ACMs], asbestos-containing construction materials [ACCMs] lead-based paints [LBPs] or lead-containing paints [LCPs], and polychlorinated biphenyls [PCBs]) associated with the Site identified below.

1.2 SITE LOCATION

A. Building B (the "Site") is located at 555 Ralph Appezato Memorial Parkway, within the College of Alameda Campus, in Alameda, California.

1.3 CONTACT INFORMATION

A. Pertinent information, including project location and the names and addresses of the site owner, is presented below.

1. Owner:
Peralta Community College District
333 East Eight Street
Oakland, California 94606

C/O: Mr. Jason Lee
Project Engineer
Roebbelen Construction Management
Phone No. 415.235.8028
jasonl@roebbelen.com
2. Consultant Representative:
Terraphase Engineering Inc.
Attn: Mr. Salvador Mendoza
Senior Project Manager
1414 L Street, Suite 100
Phone No. 916.661.2484
sal.mendoza@terrphase.com

B. This project is Prevailing Wage.

C. This section is provided for convenience only - the description of site conditions presented herein may not be all inclusive and/or accurate. Prospective Contractors shall be responsible for determining/verifying all existing Site conditions as required by Technical Specification Section 00300 - Technical Information.

1.4 SUMMARY OF EXISTING CONDITIONS

A. The structure encompasses approximately 45,000 square feet and appears to have been completed circa 1950s. The structure was observed to be in good condition and was constructed with concrete tilt up perimeter walls situated on a concrete slab foundation. Interior finishes included a textured gypsum wall system, concrete walls, and suspended ceiling panels throughout. Flooring materials consisted of vinyl floor tiles, sheet flooring, ceramic floor tiles, and exposed concrete. Exterior finishes included painted concrete walls. The roofing system consists of a gravel capped tar and composition shingles.

B. The following building materials have been identified as containing asbestos at the Site;

- Brown insulation material located beneath the white gravel capped roofing material was observed to be in good condition, encompasses approximately 27,000 square feet, and is classified as an ACCM.
- White joint compound material applied to gypsum boards was observed to be in good condition, encompasses approximately 10,000 square feet, and is classified as an Category II non-friable ACM.
- White 9-inch vinyl floor tiles and associated mastic located in the second-floor storage rooms were observed to be in good condition, encompass approximately 500 square feet, and are classified as Category I non-friable ACMs.
- Grey gaskets associated with the boiler system was observed to be in good condition, encompasses approximately 3 square feet, and are classified as Category II non-friable ACMs.
- White hard pack Thermal System Insulation (TSI) was observed to be in good condition, encompasses approximately 10 square feet, and is classified as a Regulated ACM (RACM).
- Black fibrous material located beneath the grey 12-inch vinyl floor tiles located in the elevator was observed to be in good condition, encompass approximately 18 square feet, and is classified as Category I non-friable ACMs.

C. Some of peeling/separated paint has been confirmed to contain lead at the Site;

- Orange paint applied to the exterior roof mounted HVAC system was observed to be intact and is classified as a LCP.
- Orange paint applied to the exterior roof mounted HVAC system I-beams was observed to be intact and is classified as a LBP.

- White paint applied to the walls located in room B207A was observed to be intact and is classified as a LCP.
 - Gray paint/coating applied to the ceramic wall tiles in the second-floor restrooms was observed to be intact and is classified as a LCP.
 - Brown paint applied to the metal door frames was observed to be intact and is classified as a LBP.
 - Blue paint applied to the wood doors was observed to be intact and is classified as a LCP.
 - Orange paint applied to the wood door was observed to be intact and is classified as a LBP.
 - White paint applied to the concrete masonry unit (CMU) walls located in the paint shop was observed to be intact and is classified as a LCP.
 - Red paint applied to the stucco wall in the paint shop was observed to be intact and is classified as a LBP.
 - Green paint applied to the wood door of the paint shop was observed to be intact and is classified as a LBP.
 - White paint applied to the metal handrail associated with the stairway was observed to be intact and is classified as a LCP.
- D. Building materials containing PCBs;
- Gray seam caulk applied to the base of the concrete walls was observed to be intact and contains trace amounts of PCBs.
 - Gray seam caulk applied to the CMU restroom wall was observed to be intact and contains trace amounts of PCBs.
 - While PCBs were not detected above the laboratory reporting limit in the grey mastic the reporting limit, 97 mg/kg, was almost double the regulatory threshold for PCBs in building materials of 50 mg/kg. Because it cannot be verified that PCBs are not present above 50 mg/kg, it is recommended that this material be abated prior to the demolition activities. The grey mastic was observed to be intact, encompasses approximately 12 linear feet, and is assumed to contain PCBs
- E. Mold amplification was not observed at the Site as part of Terraphase's assessment.
- F. On-site piping may contain various chemicals/residual liquids.
- G. There is existing freshwater service at the site.
- H. There is existing electric service at the site. Electric service has not been disconnected to the buildings/other structures.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

-END SECTION-

PROJECT SPECIFIC ABATEMENT SPECIFICATIONS
BUILDING B DEMOLITION PROJECT
COLLEGE OF ALAMEDA - 555 RALPH APPEZZATO
MEMORIAL PARKWAY
ALAMEDA, CALIFORNIA
PROJECT NO. 0034.016.003

SECTION 00100
EXISTING CONDITIONS
PAGE 4

SECTION 00200
SUMMARY OF WORK

PART 1 - GENERAL

1.1 INTENT

A. It is the intent of this Section to summarize the Work Items that must be completed by the Contractor under the Contract. The work items summarized below are not all-inclusive.

B. The Contractor shall be responsible for providing all labor, equipment, materials, and services necessary and as appropriate for completing the Work summarized in this Section in a timely and cost-effective manner. The Contractor shall coordinate with Terraphase as needed to complete the Work specified in the Bid Documents.

1.2 WORK SPECIFIED

A. The Contractor shall perform all the Work Items summarized in this Section in accordance with the Contract Documents, as defined in Technical Specification Section 00700, Terraphase required procedures, and applicable Laws and Regulations to the satisfaction of Terraphase.

B. All Work Items described in this Section shall be included in a Lump Sum Bid proposal. The provisions and assumptions summarized in this Section shall be used by the Contractor as a basis for developing the proposal.

C. If performance of out-of-scope work is required by Terraphase, such work shall be conducted by the Contractor on a Time and Material (T&M) basis and payment for such work shall be made to the Contractor based on T&M Prices requested in the T&M Rate Schedule provided by the Contractor and agreed to by Terraphase.

D. No out-of-scope work shall be started until approved by Terraphase.

E. This project is Prevailing Wage.

1.3 QUANTITIES AND MEASUREMENTS

A. All quantities specified in the Contract Documents are provided for convenience only and shall not be relied upon by the Contractor for the bidding purposes. The Contractor shall be responsible for determining the actual quantities, lengths, areas, and other dimensions and measurements in accordance with Technical Specification Section 00300 – Technical Information.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. To be specified and provided by the Contractor, except where specifically required elsewhere in the Contract Documents.

PART 3 - EXECUTION

3.1 SCHEDULING, COORDINATION AND AREAS AVAILABLE TO CONTRACTOR

A. There may be ongoing work activities by others at the site. The ongoing work may include remediation activities and continued visitors. These activities will continue concurrently with implementation of the Work subject to this request for proposal (RFP).

B. Due to safety concerns, prior to initiating the abatement work in any area, Contractor shall independently verify that all potential energy sources that could affect the work are isolated and/or de-energized, complete Lock Out/Tag Out (LOTO) and provide Terraphase the opportunity to place a lock on the LOTO areas. The Contractor shall be responsible for disconnecting and controlling any energy sources that may affect performance of the Work, including electrical disconnections.

C. After receipt of a notice to proceed and prior to mobilizing to the site, the Contractor shall update its Abatement Schedule that will have been submitted by the Contractor as part of its Bid Submittals. Thereafter the Contractor shall update the schedule weekly to reflect work completed and any changes to future work and submit the updated schedule to Terraphase.

3.2 CONTRACT DRAWINGS

A. Approximate location of abatement areas subject to this RFP are presented on Figure 1.

B. Features, locations and horizontal limits shown on the Figure may not be accurate and are not all-inclusive. The intent of the Figure is to aid the Contractor in locating selected features that need to be addressed under the Contract Documents, and not to be an all-inclusive, stand-alone document. The Figure shall be used together with other Contract Documents, including, but not limited to this Section, to determine the scope of the Work required at the site.

3.3 SUMMARY OF WORK

A. The following main work activities shall be completed by the Contractor:

1. Mobilize all labor, equipment and materials to the site.
2. Prepare plans and submittals required by this RFP.
3. Prepare required regulatory notifications for asbestos abatement and other work, as required by applicable Laws and Regulations. The notifications shall be prepared in accordance with applicable regulatory requirements and as specified in Technical Specifications.

4. Coordinate with Terraphase on planned start of the field Work.
5. Protect all on-site structures that are scheduled to remain during and after implementation of the Work.
6. Disconnect/de-energize electric service from all lamps/ballasts to be removed; from all asbestos abatement areas, and from all lead paint removal areas, as needed for safe performance of the Work.
7. The electrical disconnections shall be limited to items/areas that require disconnection for safe performance of the Work per Item 3.3-A-6 of this Section. If possible, the Contractor shall avoid disconnecting electric service from other items/areas that do not require electrical disconnection to support the Work subject to this RFP.
8. Abate all asbestos-containing materials (ACMs) from affected areas with prior approval from Peralta. For more details on the abatement scope and limitations refer to Technical Specification Section 01100 – Asbestos Abatement.
9. Remove loose and flaky lead-based paint from affected areas. For more details on the abatement scope and limitations refer to Technical Specification Section 01110 – Loose Lead-Containing Paint Removal.
10. Remove regulated PCBs from affected areas. For more details on the abatement scope and limitations refer to Technical Specification Section 01120 – Regulated PCB Abatement.
11. Handle, segregate, containerize, label, profile, transport and dispose of generated waste materials and recyclable materials as specified in Technical Specification Sections 01100 and 01500.
12. Demobilize all labor, equipment and materials from the site.

3.4 STRUCTURES TO BE PROTECTED

A. These specifications are for Building B only. The remaining campus structures are to be protected during the demolition activities. These structures shall be protected only to the extent that does not conflict with performance of the Work specified in this RFP.

1. Active and inactive product piping. The piping shall be protected from damage. All piping scheduled for abatement shall remain intact after completion of the abatement work. Abatement of product piping via removal of pipe sections (i.e., “remove and wrap”) will not be permitted.
2. Perimeter fencing, exterior fire suppression system, and water distribution system.
3. Other site features not scheduled for abatement/removal under this RFP.

-END SECTION-

SECTION 00300
TECHNICAL INFORMATION

PART 1 - GENERAL

1.1 DEFINITIONS

A. Terms used in this Section and throughout the Bidding Documents are defined in Technical Specifications Section 00700 - General Conditions.

1.2 FAMILIARIZATION WITH THE WORK

A. Prior to submitting the bid, each prospective Contractor shall familiarize themselves with the following:

1. Bidding Documents.
2. The Work and the site where the Work is to be performed.
3. Local labor, regulatory and other pertinent conditions.
4. All applicable laws, regulations, and other factors that may affect performance of the Work.

B. Prospective Contractors shall correlate observations at the site with the requirements of the Bidding Documents and satisfy themselves of the expense and difficulties associated with performing the Work.

C. Contractors shall be responsible, by means of visual observations and review of available information, for determining quantities, measurements, locations, types, conditions, and other pertinent site features that may affect performance of the Work. Where visual observations are not feasible (or for other clarifications) the Contractor shall state assumptions (beyond the assumptions provided in the Bidding Documents) to support the quoted costs.

D. All quantities specified in the Contract Documents are provided for convenience only and shall not be relied upon by the Contractors.

E. It is assumed that the submission of a bid by a prospective Contractor will have complied with this Section. Failure to comply with the requirements of this Section shall not be used as a basis for a Change Order.

F. Nothing in this Section or any other part of the Bidding Documents shall relieve prospective Contractors from their obligation to comply with the requirements specified in Items 1.01 A, B and C of this Section.

1.3 SITE ACCESS AND AREAS AVAILABLE TO THE CONTRACTOR

A. Terraphase will provide access to the site for the purpose of performing the Work by Contractor.

B. Contractor shall limit their operations to areas located inside of a perimeter fence surrounding the site.

C. Use of on-site temporary facilities by Contractor and its Subcontractor(s) shall be as specified in Technical Specifications Section 01010 - Temporary Facilities.

1.4 USE OF SPECIFIED EQUIPMENT AND MATERIALS

A. Bids shall be based upon the use of equipment and materials of manufacturers and suppliers mentioned by name in the Bidding Documents.

B. Substitutions will be considered as set forth in the Technical Specifications Section 00700-General Conditions.

1.5 UTILITIES

A. On-site water and electric service will be made available to Contractor at no additional cost to the Contractor. The Contractor shall be responsible for any hook-ups and connections to the existing service. The bid price shall include all costs associated with such hook-ups and connections.

B. Telephone and other communication services shall be provided by Contractor. The Bid price shall include all costs associated with providing telephone and other communication services.

1.6 TESTING AND INSPECTIONS

A. Tests, inspections, and related activities called for throughout the Contract Documents shall be conducted by Contractor, unless otherwise specified in the Contract Documents.

B. All samples must be sent to an approved laboratory for analysis.

1.7 INDIRECT COSTS

A. Taxes:

1. All applicable sales, use, compensating or other taxes imposed by any taxing authority on equipment and materials to be incorporated in the Work, and on any or all other cost items entering into the Contract Price, shall be included in the Lump Sum Bid price.
2. Prospective Contractors shall include all such taxes except those on equipment and materials, if any, furnished by Terraphase and/or owner, and shall furnish taxing authorities any information or reports pertaining thereto as required.

1.8 QUALIFICATIONS

A. With the bid, the Contractor shall provide a list of Subcontractors to be used for the work, including the following information: type of work to be performed by each Subcontractor; qualifications for the work, along with specific safety information including Total Recordable Incident Rate (TRIR), Lost Time Incident Rate (LTIR), Experience Modification Rating (EMR), number of fatalities for the last five years, OSHA 300 logs, a summary and description of each incident, and

anticipated number of employees that will be used to complete the work. Averages of multiple years will not meet this requirement. The required tables are included as an attachment to this Section.

B. The Contractor and Subcontractors that the Contractor will use to perform the Work shall provide proof that they are qualified and licensed in accordance with all applicable laws of the state and local governments where the project is located. The Contractor must submit applicable qualifications and licenses with its Bid Submittal.

1.9 START AND COMPLETION OF THE WORK

A. The Work shall commence within ten (10) business days after the Notice to Commence Work has been issued to a successful Contractor. Contractor is expected to file appropriate notifications immediately upon Notice to Commence Work to allow field work to progress within 10 business days. Work will be allowed to begin earlier than 10 business days.

B. Completion of the Work is required within timeframes proposed by prospective Contractor with its Bid Submittal and subsequently agreed to by Terraphase. Terraphase wishes to complete all the Work subject to the RFP by date to be determined by Roebbelen Construction Management (Roebbelen).

1.10 BID DUE DATE AND TIME

A. The bids are due on date to be determined by Roebbelen. Prospective Contractors shall submit their bids on a bid form included in Technical Specification Section 00400 via e-mail to: Roebbelen.

B. Any bid-related questions shall be directed to Roebbelen via email (see above) or at their office.

C. Any prospective Contractor that discovers ambiguities or is in doubt as to the meaning of any part of the Bidding Documents shall request an interpretation or clarification thereof. Interpretations and clarifications will be used to each prospective Contractor along with a phone call to expedite the process and confirm understanding.

1.11 SUBMITTALS WITH THE BID

A. The following submittals are required with the Bid:

1. Proposed Lump Sum Bid Price (completed Lump Sum Bid Form included in Section 00400, Attachment A).
2. Supplemental pricing for out-of-scope work (if any) (completed T&M spreadsheet included in Section 00400, Attachment B).
3. Safety metrics (completed tables attached to this Section)
4. A draft Asbestos Abatement Plan (draft AA Plan) that, at a minimum, shall include the following:
 - a. Identification of abatement methods and material handling procedures to be used to safely abate ACMs.

- b. Proposed phasing of the abatement activities, i.e., proposed schedule showing major activities and durations.
 - c. Airborne dust/asbestos control equipment and methods to be implemented by the contractor.
- B. A proposed implementation schedule in a bar graph format or other format that clearly identifies major tasks and milestones. At a minimum, the proposed schedule must show the following:
- 1. An overall length of the project
 - 2. An anticipated duration of each Work task
 - 3. A critical path for implementing the Work
- C. Information pertaining to proposed Subcontractors, including previous project descriptions, names, and qualifications.
- D. Proposed waste transporters and waste disposal facilities.
- E. Resumes of proposed key Project Personnel (such as, but not limited to Project Manager, Site Superintendent and Health and Safety Supervisor).
- F. Any exceptions the Contractor has to the RFP (if any).

1.12 SUBMITTALS AFTER AWARD

- A. Submittals after award of Contract shall be as specified elsewhere in Technical Specifications. Following the award of Contract, Terraphase will share a detailed submittal log with the successful contractor to facilitate Contractor submittals and Terraphase review.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

-END SECTION-

SAFETY METRIC SUBMITTAL
Building B
Asbestos Abatement, Paint Removal, and Regulated PCB Abatement

Safety Metric/Year		Contractor	Subcontractor 1	Subcontractor 2	Subcontractor 3	Subcontractor 4	Subcontractor 5
Total Recordable Incident Rate	2016						
	2017						
	2018						
	2019						
	2020						
Lost Time Incident Rate	2016						
	2017						
	2018						
	2019						
	2020						
Experience Modification Rating	2016						
	2017						
	2018						
	2019						
	2020						
Number of Fatalities	2016						
	2017						
	2018						
	2019						
	2020						

Note:

1. Total Recordable Incident Rate = is the total number of non-fatal work-related injury and illness cases x 200,000 divided by the number of hours worked for a time period by all employees.
2. Lost Time Incident Rate = is the number of lost time cases x 200,000 divided by the number of hours worked for a time period by all employees.
3. *Experience Modification Rating = compares a company's actual losses with its expected losses by industry type. The formula incorporates factors that take into account company size, unexpected large losses and the difference between loss frequency and loss severity to achieve a balance between fairness and accountability. An EMR less than one means that a company has fewer losses than expected.*

PROJECT SPECIFIC ABATEMENT SPECIFICATIONS
BUILDING B DEMOLITION PROJECT
COLLEGE OF ALAMEDA - 555 RALPH APPEZZATO MEMORIAL PARKWAY
ALAMEDA, CALIFORNIA
PROJECT NO. 0034.016.003

SECTION 00300
TECHNICAL INFORMATION
PAGE 12

SECTION 00400

BID FORMS

PART 1 - GENERAL

1.1 BID FORMS

- A. See attached bid forms.
- B. This project is Prevailing Wage.

FORM FOR GENERAL BID

DATE: _____

Owner:

Peralta Community College District
333 East Eight Street
Oakland, California 94606

C/O: Mr. Jason Lee
Project Engineer
Roebbelen Construction Management
Phone No. 415.235.8028
jasonl@roebbelen.com

For: Abatement Activities, Building B – College of Alameda

Bids will be received until 1400 (Pacific Standard Time) date to be determined by Roebbelen at the office of Roebbelen Construction Management to the attention of Mr. Jason Lee. Bids via facsimile and/or email will be accepted.

A signed/stamped fax/email followed by overnight receipt of original General Bid form shall be acceptable. In compliance with your invitation for bids for this project at the College of Alameda the undersigned Bidder, a corporation organized and existing under the laws of _____

_____ or a partnership consisting of _____
_____ or an individual trading as _____
_____ located at _____

_____ have examined the Scope of Work, and being fully advised as to the extent and character of the work to be performed, and the equipment to be furnished, hereby propose to furnish and pay for all labor, tools, material, and equipment necessary for the performance of the above-mentioned work.

The Bidder will include the following documents with the bid submission:

- **Bid Form, Properly Signed and Stamped**
- **Indemnity Agreement, Properly Signed and Stamped**
- **Statement of Insurance (General Liability and Pollution)**
- **Proof of Workmen's Compensation Insurance**
- **Proposed Schedule of Remediation Work to include shifts and numbers of workers to be used to complete the work of the project**

The undersigned Bidder further proposes to perform all Work and furnish and pay for all equipment in accordance with the Project Scope of Work.

PROJECT SPECIFIC ABATEMENT SPECIFICATIONS
BUILDING B DEMOLITION PROJECT
COLLEGE OF ALAMEDA - 555 RALPH APPEZZATO
MEMORIAL PARKWAY
ALAMEDA, CALIFORNIA
PROJECT NO. 0034.016.003

SECTION 00400
BID FORMS
PAGE 14

This Bidder agrees to perform work indicated by the Project Scope of Work for the Lump Sum of (show in both words and figures):

BASE BID SCOPE OF WORK FEE PROPOSAL

Asbestos Abatement

The lump sum fee for the asbestos abatement and waste disposal of the asbestos containing building materials:

_____ (in figures) _____ (in words)

Lead Remediation/Stabilization

The lump sum fee for the asbestos abatement and waste disposal of the asbestos containing building materials:

_____ (in figures) _____ (in words)

PCB Abatement

The lump sum fee for the asbestos abatement and waste disposal of the asbestos containing building materials:

_____ (in figures) _____ (in words)

The undersigned agrees that, if selected as the Contractor, he/she will execute a subcontractor agreement within 2 days (Saturdays, Sundays and holidays excluded) with Peralta after presentation thereof by the awarding authority. The undersigned hereby certifies that he/she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work. The undersigned hereby certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

Date _____
Name of Firm: _____
Signed By: _____ Title: _____
Bidder's Address: _____
Bidder's Telephone Number: _____
Corporate Seal

Note: If a corporation, the bid must be signed by a person authorized by the corporation by-laws to enter into bidding Contracts for the corporation.

END OF BID PROPOSAL

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

-END SECTION-

SECTION 00700
GENERAL CONDITIONS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Wherever used in this Section or elsewhere in the Contract Documents, the following terms have the following meanings:

1. ACM – Asbestos containing material.
2. ACCM – Asbestos containing construction material.
3. Addendum – written or graphic instrument that clarify, correct or change the bidding requirements of Contract Documents.
4. Agreement – the written contract between Terraphase and the Contractor.
5. Application for Payment – the form acceptable to Terraphase which is to be used by the Contractor in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
6. Terraphase – Terraphase Engineering Inc.
7. Bid – the offer or proposal the bidder submitted on the prescribed form setting forth prices for the work to be performed.
8. Bidding Documents – the invitation to bid and the Contract Documents (including all addenda issued prior to receipt of bids).
9. Change Order – a document which authorizes an addition, deletion or revision in the work, or an adjustment in the contract price or the contract times, issued on or after the effective date of the agreement. A Change Order becomes binding part of the Contract Documents only if agreed to and signed by Terraphase and the Contractor.
10. Contract Documents – means the following items and documents in descending order of precedence: a) all written modifications, amendments and Change Orders; b) Fully executed Agreement for Contractor Services between Terraphase and the Contractor, including all attachments, schedules and exhibits; c) Request for Proposal, Instructions to Bidders, and Technical Specifications, including all appendices, attachments, exhibits, drawings, completed bid forms and schedule of values.
11. Contract Price – the moneys payable by Terraphase to the Contractor for completion of the work in accordance with the Contract Documents.

12. Contract Times – the number of days and/or the dates stated in the Contract Documents:
 - a) to achieve substantial completion;
 - b) to complete the work to Terraphase satisfaction.
13. Contractor – the person, firm or corporation with whom Terraphase has entered into the agreement.
14. Defective – work or product that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test of approval referred to in the Contract Documents, or has been damaged prior to acceptance of final payment by Terraphase (unless responsibility for the protection thereof has been assumed by Terraphase at substantial completion).
15. Drawings – the drawings that show the scope, extent and character of work to be furnished and performed by the Contractor and which have been referred to in the Contract Documents.
16. Effective Date of the Agreement – the date indicated in the Agreement on which it becomes effective. If no such date is indicated, it means the date on which the agreement is signed and delivered by the last of the two parties.
17. Field Order – a verbal or written order issued by Terraphase which orders minor changes in the work, but which does not involve a change in the contract price or the contract times.
18. Figures – the drawings that show the scope, extent and character of work to be furnished and performed by the Contractor and which have been referred to in the Contract Documents.
19. Hazardous Waste – the term “hazardous waste” shall have the meaning as defined in applicable federal and California regulations.
20. Laws and Regulations – any and all applicable laws, rules, regulations, ordinances, codes and orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction over the project sites.
21. Loss Prevention System (LPS) – a tool to help prevent injuries and incidents and to support continuous improvement in health and safety performance.
22. Lump Sum – the fixed and designated sum paid to the Contractor for the completion of specific Work required by the Contract Documents.
23. Notice of Award – the written notice by Terraphase to the successful Contractor stating that Terraphase will sign and deliver the Agreement.
24. Notice to Commence Work – a written notice given by Terraphase to the Contractor fixing the date on which the contract times will commence to run and on which the Contractor shall start to perform Contractor’s obligations under the Contract Documents.
25. Owner – Peralta Community College District. Also referred to in the Bidding Documents as Peralta.

26. PCBs – polychlorinated biphenyls
27. Project – the total construction of which the work to be provided under the Contract Documents may be the whole, or a part as indicated in the Contract Documents.
28. RACM – Regulated Asbestos-Containing Material, as defined in applicable regulations.
29. Samples – physical examples of materials, equipment or workmanship that are representative of some portion of the material, equipment or work, and which establish the standards by which such portion will be judged.
30. Subcontractor – the person, firm or corporation having a direct contract with the Contractor for the performance of a part of the work.
31. Site – Building B located within the in Alameda County, California and applicable right of ways/easements.
32. Specifications – the portion of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.
33. Substantial Completion – the work (or specified part thereof) has progressed to the point where, in the opinion of Terraphase, it is sufficiently complete, in accordance with the Contract Documents, so that the work (or specified part) can be utilized for purposes for which is intended; or when the work is complete and ready for final payment.
34. TSCA – Toxic Substances Control Act regulations contained in 40 CFR Part 761: Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Use Prohibitions.
35. Underground Facilities – all pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, oil-water separators, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, water, liquid petroleum products, oil/water separation, telephone or other communications, cable television, sewage and drainage, traffic or other control systems, utilities or services.
36. Work – the entire completed abatement and demolition or the various separately identifiable parts thereof, required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the abatement and demolition, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

1.2 RELATED DOCUMENTS

- A. General Conditions presented in this Section supplement General Terms and Conditions specified elsewhere in the Contract Documents, including, but not limited to, Contractual Terms and Conditions.

B. If there is a conflict between provisions specified in this Section and provisions specified elsewhere in the Contract Documents, the more stringent provision that affords greater benefit to the Owner, as determined by Terraphase at its sole discretion, shall govern.

1.3 ROLES AND RESPONSIBILITIES

A. Owner: The Owner will be responsible for:

1. Review and approval of Change Orders, as warranted, based on Terraphase's recommendations.
2. Sign hazardous waste profiles and manifests, non-hazardous manifests and other waste transport documents (e.g. bill of lading).

B. Terraphase: Will be responsible for and will:

1. Interact with regulatory agencies and other third-party entities on behalf of the Owner. Terraphase will define the roles and responsibilities that the Contractor will have with regard to interaction with selected agencies, authorities, municipalities and other third-party entities.
2. Work with the Contractor to optimize changed conditions in the field.
3. Maintain consistent communication between all parties and efficient exchange of information.
4. Prepare Field Orders to track and address variable field conditions. Major field order items may need to be communicated with the appropriate regulatory authority, and/or with Terraphase's Project Manager and the Owner's Project Manager.
5. Observe the execution of the Work, prepare field reports and review field reports prepared by the Contractor.
6. Perform construction quality assurance tasks.
7. Observe and monitor construction quality control (QC) testing and other QC activities.
8. Track progress of the Work, based on proposed schedule, steward budget, and work performance.
9. Confirm that the Contractor accomplishes the following:
 - a. Maintains on-site one copy of the required documents as required by applicable Laws and Regulations and as required by the Contract Documents.
 - b. Maintains on-site record of the actual revisions to Work.
 - c. Maintains on-site records of the Contractor submittals, testing results, survey data and other project documents during the entire Site operations.
10. Provide management and direction to the Contractor during the implementation of the work and serve as the single point of contact at the site.

11. Communicate with the Owner and the Contractor. Communications with the Contractor will be mainly through the Contractor's Construction Manager/On-site Supervisor. The Contractor's communication with the Owner must be conducted through Terraphase.
 12. Maintain an on-site project log containing hazardous and non-hazardous waste manifests and other shipment documents for all waste streams generated during the work.
 13. Organize, lead, and document daily and weekly project status meetings at the site. Provide updates to Owner including updates on safety, environmental, cost and schedule matters.
- C. Contractor: Will be responsible for:
1. Familiarizing itself with all existing conditions, as they pertain to performance of the Work, prior to submitting a Bid for the Project. This should include, but is not limited to, review of the Bidding Documents and other available information, and visual observation of the existing field conditions.
 2. Initiating and completing the Work within times specified in the Contract Documents.
 3. Implementing the Work specified in the Contract Documents in an efficient, timely, cost effective and safe manner in accordance with applicable Laws and Regulations.
 4. Provide daily and weekly project status information to Terraphase including safety, environmental, cost and schedule updates.

1.4 COMMUNICATIONS

- A. Except as otherwise provided in this Section, all Contractor's communications shall be through the Terraphase Construction Manager.
- B. The Contractor shall be responsible for communicating hazard-related information to its employees, subcontractors and Terraphase in accordance with the site-specific HASP and applicable Laws and Regulations.

1.5 EMERGENCIES

- A. In emergencies affecting the safety of persons or the Work or property, the Contractor, without special instruction or authorization from Terraphase or the Owner, is obligated to act to prevent threatened damage, injury or loss. If Terraphase Construction Manager determines that a change in the Contract Documents is required because of the action taken by the Contractor in response to such emergency, a Change Order will be issued to address the consequences of such action.

1.6 PERMITS

- A. The Contractor shall be responsible for preparing and providing all notifications and applications to regulatory agencies, and for obtaining any and all permits necessary for performance of the Work, unless otherwise specified in the Contract Documents.

B. The Contractor shall be responsible for all costs and fees associated with preparing, providing and obtaining the necessary notifications, applications and permits, unless otherwise specified in the Contract Documents. Cost for these items shall be included in the Contractor's Lump Sum Bid.

1.7 CONTRACT DOCUMENTS: INTENT

A. The Contract Documents comprise the entire agreement between Terraphase and the Contractor concerning the Work.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be implemented in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade as being required to complete the Work shall be furnished and performed, whether or not specifically called for.

C. Terraphase, on behalf of the Owner, reserves the right to reduce the amount of work/ number of work areas included in this bid either in part or whole for whatever reason whether it be economic, operational, strategic, etc. Terraphase reserves the right to award the Work to multiple Contractors. Should the Work be awarded to multiple contractors, the Work awarded to each Contractor will be clearly defined by Terraphase.

1.8 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

A. The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof only in one (or more) of the following:

1. A formal Written Amendment
2. A Change Order

B. The Contractor shall not perform any work outside the requirements of the Contract Documents without formal written authorization from Terraphase.

C. In addition, the requirements of the Contract Documents may be supplemented and minor variations and deviations in the Work may be authorized, by one of the following methods:

1. A Field Order
2. Terraphase's written interpretation or clarification.

1.9 CHANGES IN THE WORK

A. The Owner and/or Terraphase may order additions, deletions or revisions in the Work. Such additions, deletions or revisions will be authorized by a Written Amendment or a Change Order. Upon receipt of such document, the Contractor shall promptly proceed with the Work involved which shall be performed under the applicable conditions of the Contract Documents.

B. If the Owner and/or Terraphase and the Contractor are unable to agree as to the extent of an adjustment in the Contract Price or an adjustment of the Contract Times that shall be allowed as a

result of a work change, a claim may be made therefore as provided in Appendix B – Contractual Terms and Conditions.

C. The Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified and supplemented, except in the case of emergency as provided in Subsection 1.05.

1.10 MINOR VARIATIONS IN THE WORK

A. Terraphase may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Terraphase and the Contractor who shall promptly perform the Work involved. If Terraphase and/or the Contractor believe that a Field Order justifies an adjustment in the Contract Price and/or the Contract Times, the change in the Work shall be addressed by means of a Change Order.

1.11 CONTRACT DOCUMENTS: REUSE OF DOCUMENTS

A. The Contractor or any other person or organization performing or furnishing any of the Work under a direct or indirect contract with Terraphase and/or the Owner:

1. Shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of the Owner and/or Terraphase.
2. Shall not reuse any of such Drawings, Specifications, other documents or copies on any other project without written consent the Owner and/or Terraphase, as applicable.

1.12 BEFORE STARTING FIELD WORK

A. The Contractor shall promptly report in writing to Terraphase any conflict, error, ambiguity or discrepancy which the Contractor may discover.

B. Within 5 calendar days after issuance of Notice to Commence Work, the Contractor shall submit to Terraphase for review the following:

1. A construction progress schedule indicating the times (number of days and/or dates) for starting and completing the various stages of the Work. The schedule shall be based on the proposed implementation schedule submitted by the Contractor as part of the Bid Submittal package, and include any changes, corrections and clarifications that the Contractor, Terraphase and/or the Owner will have agreed to during the bid review and contractor selection process. If no changes, corrections and/or clarifications to the schedule are requested by Terraphase and/or the Owner during the bid review and the Contractor selection process, the Contractor shall finalize the existing schedule without changes. Terraphase reserves the right to request additional changes, corrections and/or

clarifications (in addition to those communicated and agreed to during the bid review and the Contractor selection) after award of Contract.

2. A preliminary Schedule of Values for all Work. The preliminary Schedule of Values shall be prepared in general conformance with costs presented on completed Bid Forms; and shall include quantities and prices of items aggregating the Contract Price. The preliminary Schedule of Values shall be prepared in sufficient detail to serve as the basis for progress payment during implementation of the Project.
3. No work is to be initiated until an Terraphase Project Manager and/or the Terraphase Construction Manager has inspected the proposed work in the field and given authorization to proceed.

1.13 SAFETY SUPERVISOR

A. Terraphase may elect to provide on-site Health and Safety Supervisor. Contractor will be allowed, but not required to provide on-site Health and Safety Supervisor.

1.14 USE OF PREMISES

A. The Contractor shall assume full responsibility for any damage to the Site, adjacent lands, structures and areas resulting from performance of the Work. Should any claim be made because any damage caused by performance of the Work, the Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claims by arbitration or other dispute resolution proceeding. The Contractor shall, to the fullest extent permitted by laws and regulations, indemnify and hold Terraphase and the Owner harmless against all claims, costs, losses and damages arising out of or resulting from any claim or action thereof.

B. During the progress of the Work, the Contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work the Contractor shall remove all waste materials, rubbish, debris and surplus materials from the premises. In particular, tripping hazards shall be consistently monitored as identified by site workers and shall be addressed immediately.

1.15 PROTECTION OF EXISTING FEATURES

A. The existing site features that are scheduled to remain and must be protected are listed in Technical Specification Section 00200-3.04.

B. The Contractor shall protect and preserve the existing features that are not scheduled for abatement, removal or modification and shall remain. The Contractor shall be responsible for replacing and/or restoring these existing features if they become damaged during the performance of the work, except as provided in Item 1.15-C of this Section.

C. The Contractor shall not be responsible for repairing and/or replacing on-site slabs- on-grade, including concrete slabs and asphalt pads, if damage to such slabs and/or pads occurs as a result of normal equipment operations in performance of the Work, unless it creates a safety/tripping

hazard. Some level of damage to on-site slabs-on-grade is expected. This shall not relieve the Contractor from its obligation to protect existing features, as specified in Item 1.15-B of this Section.

D. Approximate locations of known utilities may be depicted on the Contract Drawings. The utility locations are depicted for convenience only and may not be all inclusive and/or accurate. The Contractor shall be responsible for verifying all existing conditions via visual observations and review of available documents, including but not limited to, the Contract Documents.

E. The Contractor shall be responsible for protecting underground facilities as needed by placement of surface materials (e.g., steel plates, crane mats) or by other means to be defined by the utility/facilities owner, or Terraphase.

F. "Hard" fencing (e.g., chain-link fence, jersey concrete barriers, etc.) shall be used to enclose critical utility areas to prevent vehicular access and construction activities. Use of "soft" fencing (i.e., orange construction tape, orange cones, etc.) as a primary measure for protecting critical utilities will not be permitted. "Soft" fencing may be used in addition to "hard" fencing to increase visibility of the "hard" barrier.

1.16 UNDERGROUND FACILITIES

A. The Contractor shall include the cost of the following in the Lump Sum Bid Price and shall have full responsibility for:

1. Reviewing and checking all available information and data.
2. Locating all Underground Facilities that may interfere with performance of the Work.
3. The safety and protection of all such Underground Facilities that shall remain and be protected, and repairing any damage thereto resulting from the Work.

1.17 MANAGEMENT OF WASTE

A. Except as provided in Items 1.17 B and C of this Section, the Contractor shall be responsible for verifying existing conditions that may affect performance of the Work, including proper characterization of waste materials and waste streams to be generated during performance of the Work. The Contractor is encouraged to use existing information (e.g., existing analytical data, generator's knowledge), as appropriate in determining proper characterization, segregation, handling and disposition of waste materials. Additional waste characterization and profiling requirements, if any, are presented in Technical Specification Section 01500 – Waste Handling, Transportation and Disposition. For any waste streams, Terraphase may request that the materials be held on-site in a secured manner for up to two weeks to allow for additional testing, as needed.

B. In the event that previously unidentified waste materials are encountered prior to or during implementation of the Work and/or in the event that a classification of the previously identified waste shall be changed, the Contractor shall immediately notify Terraphase Construction Manager. The notification should be in writing (including email) and include description of the waste (as known at the time of discovery), waste location, anticipated quantity, and proposed waste characterization method.

C. Upon notification of the presence of the previously unidentified waste material and/or changed classification of the previously identified waste, Terraphase may collect and submit for laboratory analyses a representative sample(s) of the newly discovered or re-classified waste material (at Terraphase's cost) and, upon receipt of analytical results, will inform the Contractor of proper waste characterization/classification. The Contractor shall then take appropriate action for the removal, handling and off-site disposition of the waste material.

1.18 EROSION AND SEDIMENTATION CONTROL

A. The Contractor shall provide and maintain best management practice (BMP) methods, equipment and temporary construction, as necessary and as requested by Terraphase, to control erosion and sedimentation at the project site(s).

B. The Contractor shall provide and maintain BMP methods, equipment and temporary construction, as necessary, to control runoff of water that came in contact with impacted debris, disturbed soils, or other project related activities beyond active work area limits.

1.19 SCHEDULE OF VALUES

A. No progress payment shall be made to the Contractor until the Schedule of Values are submitted to Terraphase in accordance with Item 1.12 of this Section and agreed upon by Terraphase.

B. The Schedule of Values established as provided in this Section shall serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Terraphase.

1.20 CHANGES IN CONTRACT PRICE

A. The Contract Price constitutes the total compensation (subject to authorized adjustments, as provided in this Section).

B. The Contract Price may only be changed by a Change Order or by Written Amendment. Change orders must be approved in advance of the actual work taking place. Any claims for an adjustment in the Contract Price shall be based on written notice delivered promptly by the party making the claim to the other party and stating the general nature of the claim. The notice shall include the amount of the claim and supporting date and shall be delivered within 24 hours after the start of the occurrence or event giving a rise to the claim. The notice shall include a written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event.

C. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this Section and approved in advance of the work taking place.

D. The value of any work covered by a Change Order for an adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by T&M Rates proposed by Contractor in the T&M Rates Form and subsequently approved by Terraphase in the Contract Documents, by application of such T&M Rates to the time, equipment, materials and other items involved.
 2. Where the Work involved is not covered by T&M Rates contained in the Contract Documents, by a mutually agreed Lump Sum (which may include an allowance for overhead and profit).
 3. Where the Work involved is not covered by T&M Rates contained in the Contract Documents and agreement to a Lump Sum is not reached, on the basis of the Cost of the Work plus a Contractor's fee for overhead and profit, not to exceed 10% of the Cost of the Work. The Contractor is to provide overhead and profit multiplier with the bid.
- E. The term Cost of the Work means the sum of all costs necessarily incurred and paid by the Contractor in the proper performance of the Work. Such costs shall be in amounts no higher than those prevailing in the locality of the Project and shall include only the following items:
1. Payroll costs for employees of the Contractor involved in the performance of the Work.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof.
 3. Payments made by the Contractor to its Subcontractors for Work performed or furnished by the Subcontractors.
 4. Cost of special consultants (including, but not limited to engineers, testing laboratories and surveyors) employed for services specifically related to the Work.
- F. The term Cost of the Work shall not include any of the following:
1. Payroll costs and other compensation of the Contractor's officers, executives, principals, general managers, estimators, accountants, purchasing and contracting agents, clerks and other personnel employed by the Contractor whether at the site or in the Contractor's office for general administration of the Work – all of which are to be considered administrative costs covered by the Contract Price.
 2. Expenses of the Contractor's principal and branch offices other than the Contractor's office at the Site, if an extension of Contract Times is warranted.

1.21 APPLICATION FOR PROGRESS PAYMENT

- A. Not more often than once a month, the Contractor may submit to Terraphase for review an Application for Payment. The Application for Payment shall cover the Work completed as of the date of the Application and shall be accompanied by appropriate supporting documentation.
- B. Terraphase will, within 10 working days after receipt of each Application for Payment, either approve the Application or return the Application to the Contractor indicating in writing reasons for returning the Application. In the latter case, the Contractor may make necessary corrections and resubmit the Application to Terraphase.

C. Terraphase may refuse to approve the whole or any part of any payment if, in Terraphase's opinion, such payment would not represent actual value of the Work completed by the Contractor. Terraphase may, at its sole discretion, request that the Contractor provides additional documentation in support of its Application for Payment to aid in determining basis for payment.

1.22 FINAL INSPECTION

A. Upon written notice from the Contractor that the entire Work or an agreed portion thereof is complete, Terraphase will make a final inspection with the Contractor and will notify the Contractor in writing of all incomplete and/or defective Work items. The Contractor shall immediately take such measures as are necessary to complete such Work or remedy deficiencies.

1.23 REJECTING DEFECTIVE WORK

A. Terraphase shall have authority to disapprove or reject Work that, in its sole opinion, is defective or does not conform to the Contract Documents. Terraphase shall also have authority to require specific inspection or testing of the Work, whether or not the Work is fabricated, installed or completed.

1.24 FINAL PAYMENT AND ACCEPTANCE

A. After the Contractor has completed all such corrections to the satisfaction of Terraphase, the Contractor may apply for final payment following the procedures for Progress Payment. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, except as previously delivered.

1.25 WAIVER OF CLAIMS

A. The making and acceptance of final payment will constitute:

1. A waiver of all claims by Terraphase and/or the Owner against the Contractor, except claims arising from Defective Work appearing after final inspection pursuant to Item 1.22 of this Section, from failure to comply with Contract Documents or the terms of any special guarantees specified therein, or from the Contractor's obligations under the Contract Documents.
2. A waiver of all claims by the Contractor against Terraphase and the Owner other than those previously made in writing and still unsettled.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

-END SECTION-

SECTION 00900
HEALTH AND SAFETY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. At a minimum, the Contractor shall comply with all applicable federal, state and local health and safety requirements, including, but not limited to those contained in applicable Occupational Health and Safety Administration (OSHA) Standards; and California OSHA (Cal/OSHA) standards.

1.2 HEALTH AND SAFETY – ADDITIONAL REQUIREMENTS

A. Requirements presented in this Subsection are in addition to those required by Subsection 1.01. If there is a conflict between the requirements presented in this Subsection and those in Subsection 1.01, the most stringent requirements, as determined by Terraphase at its sole discretion, shall apply.

B. Contractor shall be responsible for the following health and safety-related activities:

1. Preparation of a site-specific Health and Safety Plan (HASP) that conforms with 29 Code of Federal Regulations (CFR) 1910 and 1926. At a minimum, the HASP shall comply with the requirements presented in Item 1.02-C of this Section.
2. Submittal of the HASP to Terraphase at least 5 calendar days prior to mobilization to the Site. The HASP shall be submitted to Terraphase for review only; acceptance of the Contractor's HASP shall not in any way relieve the Contractor from its responsibility to comply with applicable health and safety standards and requirements for its employees.
3. In lieu of Items 1.02-B-1 and 1.02-B-2 of this Section, with the approval of Terraphase, the Contractor may agree to follow and comply with the Terraphase HASP: however, the Contractor takes full responsibility for preparing task-specific hazard assessments and mitigating measures, job safety analyses (JSAs), and any other procedures and/or plans required or requested by Terraphase. Terraphase will provide a successful Contractor with a copy of the site-specific HASP and require all Contractor and Subcontractor site workers sign-off certifying they have read and understand the contents of the HASP and agree to abide by it. The Terraphase HASP has not yet been updated to reflect all of the activities that will be performed as part of the Work.
4. The Contractor shall be directly responsible for health and safety of its employees and employees of its Subcontractors, regardless of which HASP option will be used.
5. Contractor shall address site/procedures/questionable behavior deficiencies and Terraphase comments (if any) and incorporate into the final HASP as warranted. The

- Contractor shall certify that all on-site personnel under the Contractor's control have reviewed and adhere to the HASP and maintain on-site records of same.
6. Provide health and safety equipment and materials, as required by the HASP. Provide supplies of personal protective equipment (PPE) for up to three (3) visitors. This shall entail hard hats, safety glasses with side shields, hearing protection, high visibility vests and cut resistance gloves and glove clips.
 - a. **EMPLOYERS shall select and require employees to use appropriate hand protection when employees' hands are exposed to hazards** such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes.
 - b. **Fixed, Open-Bladed Knives are not allowed on site.**
 7. Provide that on-site personnel, at all times, don appropriate PPE per applicable Laws and Regulations, site standards and/or task specific JSA.
 8. Provide that a sufficient quantity of water is available for asbestos abatement operations and decontamination purposes.
 9. Site personnel must be trained per CFR 1926.21 (Safety Training and Education). The Contractor shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to the work environment to control or eliminate any hazards or other exposure to illness or injury. The Contractor must provide a comprehensive list of training records.
 10. Provide that site personnel directly involved in hazardous materials operations and/or working within the Exclusion Zone and/or Contamination Reduction Zone have completed OSHA 40-hour hazardous materials training and corresponding annual 8- hour refresher training. Site supervisory personnel shall, at a minimum, have completed the 8-hour Supervisor's Course per CFR1910.120.
 11. Site personnel shall have the required medical clearances and shall provide copies of medical clearance records to Terraphase prior to initiating the Work. Personnel records shall be maintained on-site for audit and verification purposes.
 12. Conduct a minimum one safety meeting daily during the implementation of the Work. Safe and injury-free implementation of the project is of a paramount importance to Terraphase. The Contractor shall include a sufficient budget in its Lump Sum Proposal for participation of its employees and its Subcontractors' employees in the safety meetings as needed to address Work-related safety concerns. No Change Order will be considered nor approved for Contractor and its Subcontractor participation in the safety meetings.
 13. Prepare JSAs for field tasks that may pose a hazard to on-site workers. Contractor shall review each JSA with personnel to be directly involved in implementation of the Work addressed in the JSA, sign and submit JSAs to the Terraphase Construction Manager daily. JSAs shall address use of the "Right Tool" for each task.

14. Exercise "stop work authority," as required, to maintain a safe working environment. All on-site employees have the right and responsibility to stop work if they feel their safety or the safety of co-workers or the public is compromised.
15. Terraphase will provide PPE and health and safety equipment for use by Terraphase employees.
16. Terraphase will perform periodic audits of employee and the Contractor employee records including training, qualifications, etc.
17. Contractor shall provide Terraphase with equipment maintenance records and a documentation stating equipment operators' qualifications and/or licensing, if applicable.
18. Contractor shall meet with Terraphase at the inception of the project and as needed during implementation of the project to determine the need to perform a risk assessment for high-risk tasks, such as work at heights, confined space work, critical lifts, etc. The goal of these meetings is to work through alternatives to mitigate potential hazards and determine if there are alternative methods to accomplish the Work. If high risk tasks are identified, the Contractor must conduct formal risk assessments. It is the Contractor's responsibility to anticipate which work items will require the preparation of a formal risk assessment based largely on Contractor- proposed methods for completing the Work. Some hazards will likely be identified after work commences. The Contractor shall include a sufficient budget in its Lump Sum Proposal for preparation of these formal risk assessments as needed to address Work-related safety concerns. No Change Order will be considered nor approved for Contractor and its Subcontractor for the preparation of the formal risk assessments.

C. HASP Document Requirements:

1. The HASP shall identify chemical, physical and biological hazards including, but not limited to:
 - a. Constituents of concern (COCs) in on-site materials
 - b. Heavy construction activities
 - c. Vectors (e.g., snakes, ticks)
 - d. Heat/cold stress
 - e. Noise
 - f. Ergonomic stresses
 - g. Other items required by Peralta
2. The HASP shall contain Safety Data Sheets for major COCs and any potential hazardous materials or other chemicals brought to the site(s) (e.g., fuel).
3. The HASP shall identify health and safety procedures and safe work practices that will be implemented to protect workers and the environment from hazardous materials in accordance with 29 CFR 1910 and 29 CFR 1926 including, but not limited to:

- a. PPE
 - b. Medical surveillance
 - c. Personnel training (i.e., LPS)
 - d. Site-specific monitoring
 - e. Work zones/controls
 - f. Decontamination
 - g. Training
 - h. Heavy construction work
 - i. Construction site access/site visitors (i.e., sign-in sheets, site security, PPE)
 - j. Construction site traffic, including access points from public highways
 - k. Utility location and protection
 - l. Water hazards
 - m. Provisions for daily safety meetings
 - n. Checklists for inspection of equipment safety devices
 - o. Confined space
 - p. Lockout/Tagout
 - q. Work at elevations
 - r. Ladder safety (note, ladder use must be approved by Terraphase)
 - s. Trip hazards and importance of housekeeping
 - t. Work in low light settings
 - u. Mitigation of projectiles
4. The HASP shall clearly identify emergency response contact information and procedures including, but not limited to:
- a. Emergency contact numbers including, but not limited to:
 - (1) On-site emergency response coordinators
 - (2) Local emergency response agencies
 - (3) Terraphase and designated emergency responder information
 - (4) Contractor's on-site supervisor
 - (5) Utility emergency contact information
 - b. Procedures to evacuate the Site, shut down equipment/utilities, assemble workers and notify appropriate personnel in the event of an emergency. The procedures will include drawings showing evacuation routes and will specify location(s) where all personnel should assemble following evacuation.
 - c. Directions to the nearest local medical emergency facility.
 - d. Designated responsibilities for on-site personnel.

- e. The location and types of emergency response equipment available at the Site (e.g., first aid kit, fire extinguisher).
 - f. Subcontractor's behavior-based safety program/approach.
 - g. Subcontractor's designated occupational medicine facility.
5. Contractor shall provide all labor, equipment and material necessary to implement the HASP provisions.
6. The HASP, along with all required records, will be maintained at the field office and be updated as necessary for the duration of the Project.

1.3 SUBMITTALS

A. Formal Risk Assessments: The Contractor shall submit a list of work items/activities that, in Contractor's opinion, will require preparation of a formal risk assessment. As presented in Item 1.02-B-18 of this Section, it is understood that additional high-risk tasks may be identified during implementation of the Work. Cost for preparing all required risk assessments, including those listed in Contractor's submittal and those that may be identified during implementation of the Work, shall be included in Contractor's Lump Sum bid price. No Change Order will be considered or approved by Terraphase because the Contractor underestimated the level of effort required to prepare the Risk Assessments.

B. Lift Plans: The Contractor shall submit a list of work items/activities that, in Contractor's opinion, will require preparation of a Lift Plan. As presented in Item 1.02-B-18 of this Section, it is understood that a need for preparing additional Lift Plans may be identified during implementation of the Work. Cost for preparing all required Lift Plans, including those listed in Contractor's submittal and those that may be identified during implementation of the Work, shall be included in Contractor's Lump Sum bid price. No Change Order will be considered or approved by Terraphase because the Contractor underestimated the level of effort required to prepare the Lift Plans.

1.4 WORK PERMIT PROGRAM

A. Provisions specified in this Section are in addition to those specified in Technical Specification Section 00700-1.06.

B. Hot Work: The use of flame emitting cutting devices (hot work) shall only be allowed on a case-by-case basis.

C. Confined Space:

- 1. No confined space work shall be undertaken without approval of Terraphase. All confined space work shall require a work permit. Contractor is required to provide two-day advance notification of planned confined space entry.
- 2. The Contractor shall provide trained emergency and rescue services for each confined space entry; or arrange for the rescue service with local emergency response providers, subject to Terraphase approval. Confined space entry into storage tanks and other locations meeting the definition of a confined space that requires a work permit will require

an Entry Supervisor and a Standby person even if no atmospheric or other hazards are present.

3. Prior to entering the confined space and during the course of confined space activities, the Contractor shall conduct continuous air monitoring. The minimum confined space atmosphere monitoring requirements are as follows:
 - a. Oxygen (O₂).
 - b. Lower explosive limits (LEL).
 - c. Total hydrocarbons (or volatile organic compounds).
 - d. Any other hazardous substance the confined space has contained.

D. Work at Heights:

1. Use of ladders will be allowed during implementation of the project when other means of accessing elevated work areas are not practical, subject to a case-by-case approval by Terraphase. Ladders may be used for accessing work area(s) only, and not for performing any work. Use of the following equipment shall be considered to access elevated work locations before attempting to use ladders:
 - a. Manlifts
 - b. Scaffolds
 - c. Mobile stair platforms
2. Contractor may propose other type(s) of equipment to be used to access elevated work locations and submit a description of such proposed equipment to Terraphase for review. Use of such equipment will be allowed only after favorable review by Terraphase.

1.5 EQUIPMENT

- A. Contractor shall comply with all applicable Laws and Regulations, including, but not limited to:
 1. National Electrical Code
 2. National Fire Protection Association 70E
 3. Local law, regulations and codes, as applicable
 4. OSHA electrical standard
- B. Ground-fault circuit interrupter protection for personnel
 1. All ground-fault circuit interruption protection shall comply with OSHA requirements presented in 1910.304(b)(3) and, at a minimum, shall include the following:
 - a. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel.
 - b. A cord connector on an extension cord set is considered to be a receptacle outlet if the cord set is used for temporary electric power. Cord sets and devices incorporating the

required ground-fault circuit-interrupter that are connected to the receptacle closest to the source of power are acceptable forms of protection.

- c. Receptacles other than 125 volt, single-phase, 15-, 20-, and 30-ampere receptacles that are not part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel.
- d. Where the ground-fault circuit-interrupter protection required by paragraph (b)(3)(ii)(B) is not available for receptacles other than 125-volt, single-phase, 15-, 20-, and 30-ampere, the Contractor shall establish and implement an assured equipment grounding conductor program covering cord sets, receptacles that are not a part of the building or structure, and equipment connected by cord and plug that are available for use or used by employees on those receptacles.

C. Extension Cords

1. Use factory-assembled cord sets.
2. Use only extension cords that are 3-wire type.
3. Use only extension cords that are marked with a designation code for hard or extra- hard usage.
4. Use only cords, connection devices, and fittings that are equipped with strain relief.
5. Continually audit cords on-site. Any cords found not to be marked for hard or extra- hard use, or which have been modified, must be taken out of service immediately.
6. An effort shall be made by the Contractor to avoid crossing any roadways with portable electrical wiring. Should such crossing be necessary, it shall be done using commercially available cable guards designed to enable roll-over by the heaviest equipment on the site.

D. Portable Fuel Containers

1. Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved safety cans or Department of Transportation-approved containers shall be used for the handling and use of flammable liquids in quantities of 5 gallons or less.
2. 29 CFR 1926.155(l) defines a safety can as: an approved closed container, of not more than 5 gallons capacity, having a flash arresting screen, spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.

1.6 EQUIPMENT FUELING

A. No internal combustion engine shall be refilled with a flammable/combustible liquid while the engine is running. Fueling shall be done in such a manner that the likelihood of spillage is minimal. If a spill occurs it shall be contained and cleaned, or equivalent action taken to control vapors before restarting the engine. Fuel tank caps shall be replaced before starting the engine.

B. A good metal to metal contact (bonding) shall be kept between fuel supply tank or nozzle of supply hose and the fuel tank. No open lights, welding, or sparking equipment shall be used near

internal combustion equipment being fueled or near storage tanks. No smoking shall be permitted at or near the gasoline storage area or on equipment being fueled. Post a conspicuous sign in each fuel storage and fueling area stating: "NO SMOKING WITHIN 50 FEET." Class I liquids shall not be dispensed by pressure from drums, barrels, and similar containers. Approved pumps taking suction through the top of the container or approved self-closing faucets shall be used. No repairs shall be made to equipment while it is being fueled.

C. Each fuel storage tank or drum shall have the word "Flammable" or "Combustible" conspicuously marked thereon and should also have a similarly sized word indicating the contents of the container. A fire extinguisher rated 20:BC or larger shall be in a location accessible to the fueling area. All fuel storage tanks, drums or safety cans shall be properly marked and of the proper type.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

-END SECTION-

SECTION 00910
PROJECT MEETINGS

PART 1 - GENERAL

1.1 WORK SPECIFIED

A. Contractor shall prepare for and attend the project orientation meeting, weekly progress meetings, daily site safety meetings, and project closeout meeting.

1.2 PROJECT ORIENTATION MEETING

A. Project Orientation meeting shall be held at the project site prior to start of field work. Representatives from all parties involved in the project execution should attend the meeting, including Terraphase, Contractor and Subcontractor(s).

B. Following award of the Contract and prior to commencement of work, Terraphase will schedule the Project Orientation meeting. The purpose of the project orientation meeting is to discuss project scope, any site-specific procedures and potential hazards, review contract requirements, review responsibilities of each party involved, and introduce various project team members.

1.3 WEEKLY PROGRESS MEETINGS

A. Weekly progress meetings shall be held at the project site(s) from commencement of the Work to substantial completion. The progress meetings will be held to discuss project- related topics including, but not limited to, project status, schedule, scope of work, and overall project implementation. Terraphase will schedule the meetings and will notify Contractor of the meeting dates and locations. At a minimum, Contractor's project manager and on-site health and safety professional shall attend the progress meetings.

1.4 DAILY SAFETY MEETINGS

A. At a minimum, one daily safety meeting will be held by Terraphase at the project site at the beginning of each day work is conducted. Topics of the daily safety meetings will include discussion of each day's activities and determining if JSAs are required for new work tasks. In addition, topics will include a review of the next day's planned work and some or all of topics listed under Item 1.03 of this Section. All on-site personnel shall attend the daily safety meetings.

1.5 PROJECT CLOSEOUT MEETING

A. A project closeout meeting(s) will be held at each project site as part of the Final Acceptance of the Work. Terraphase will schedule the meetings. The project closeout meetings will be held to review Contractor's work and to address unfulfilled contract requirements (if any).

1.6 OTHER MEETINGS

A. All meeting requirements specified elsewhere in the Contract Documents shall apply.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

-END SECTION-

SECTION 01000

MOBILIZATION/DEMOBILIZATION

PART 1 - GENERAL

1.1 WORK SPECIFIED

A. Mobilization: Contractor shall be responsible for timely and complete mobilization of all equipment, materials, supplies, and personnel to the site, as necessary to complete all the Work (or part of thereof) identified in the Contract Documents.

B. The Contractor shall be responsible for installing and maintaining proper barriers and signage around the active work area(s). For more requirements on barriers refer to Technical Specification Section 00700-1.15.

C. Demobilization: Upon completion of the Work, the Contractor shall remove all equipment, materials, supplies, and personnel from the site. Prior to removal, all Project-related equipment and materials that come into contact with impacted site materials shall be decontaminated as specified in Item 3.02 of this Section or disposed of in accordance with all applicable Laws and Regulations and the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. To be specified and supplied by the Contractor.

PART 3 - EXECUTION

3.1 MOBILIZATION

A. Contractor shall verify existing site conditions and carefully examine all Bidding Documents to develop an understanding of the conditions that may be encountered during performance of the Work. The Contractor shall be responsible for all costs and liability associated with damaging any existing utility or structure (above and/or below grade) that is not subject to abatement, demolition and/or removal under the Contract, including but not limited to, buildings, utilities, gas lines, fences, etc. The Contractor shall protect all monitoring/recovery wells from any damage and shall make each monitoring/recovery well location readily accessible, if requested by Terraphase or the Owner. The Contractor shall also be responsible for replacing (at the Contractor's expense) any damaged structures or utilities to the condition that existed at the start of the Contractor's work using equal or better materials to the satisfaction of Terraphase and the Owner. The Contractor assumes full responsibility to properly secure all temporary structures and equipment under the Contractor's control to prevent damage or theft to the equipment, as well as surrounding areas, structures and

adjacent properties. Should such damage or theft occur, restoration/replacement costs shall be at the Contractor's sole expense.

B. The Contractor shall be responsible for mobilizing all equipment, materials, supplies, and personnel to the site. All of the Contractor's (and its Subcontractors') equipment mobilized to the site shall be thoroughly cleaned and inspected prior to mobilization on-site. Based upon inspection by Terraphase, equipment that is not visibly clean upon mobilization to the site shall be taken off-site and cleaned by the Contractor prior to remobilization at no additional cost to Terraphase and the Owner.

C. All critical safety devices, such as shut down switches, guards, etc., on all equipment are to be inspected and/or actuated prior to arrival at the site and before job start each day the equipment is in use. JSAs for the work should identify safety devices on the equipment and ensure they are functional and operating personnel trained on their use.

D. The Contractor shall supply written qualifications of all operators. At a minimum each operator shall have documented experience of three other jobs working as an operator. Terraphase can request removal of an operator in the event an operator is not well versed in the operation of equipment safety controls, devices and procedures.

E. The Contractor shall be responsible for construction of support areas and waste staging area(s) in accordance with the AA Plan to be prepared and provided by the Contractor in accordance with the requirements specified in Technical Specification Section 01100. The Contractor shall establish areas for equipment storage and segregation of wastes (i.e., non-hazardous waste, hazardous waste).

F. Provisions shall be made to mitigate and address, to the satisfaction of Terraphase, any off-site tracking of materials. All equipment leaving the site on a daily basis shall be cleaned, as needed, to prevent mud/dirt/debris marks in roads beyond the site limits.

3.2 DEMOBILIZATION

A. All equipment, materials, and personnel shall be removed from the site following completion of the Work.

B. All non-disposable equipment that has been used during implementation of the Project and has come in contact with site-related materials (e.g., asbestos-containing material, oils, solid/semi-solid material,) or other related materials shall be decontaminated before being removed from the site. Equipment decontamination shall be performed in a designated area (to be proposed by the Contractor and reviewed by Terraphase).

1. Decontamination of non-disposable equipment that does not come into contact with site-related regulated liquids/semi-liquids (e.g., oils, petroleum, semi-solid material/oil) shall be deemed complete based on a visual observation by Terraphase. Equipment that does not meet the "visibly clean" objective, as determined by Terraphase, shall be re-cleaned by the

Contractor at no additional cost to Terraphase or the Owner until the “visibly clean” standard is achieved, as determined by Terraphase.

2. Non-disposable equipment that comes into contact with any site-related, regulated liquids/semi-liquids or other related materials must be decontaminated prior to removal from the site. Decontamination of such non-disposable equipment shall be conducted using a minimum of appropriate and industry-recognized non-toxic decontamination materials. Decontamination shall take place in a separately constructed decontamination area suitable for the size of the equipment to be decontaminated and using materials appropriate for the collection of the site-related liquids/semi-liquids, or other regulated materials and the decontamination materials.
3. Following completion of decontamination activities, the Contractor shall place all materials generated as a result of the equipment decontamination into USDOT- approved containers for subsequent characterization and off-site disposal by the Contractor. At the completion of the demobilization, no Contractor’s (or its Subcontractors’) equipment, supplies, or other materials shall remain on the site in accordance with final site conditions requirements of the Contract Documents.
4. The Contractor shall be responsible for the collection, containerization, characterization, profiling, manifesting, loading, rigging, transportation, and disposal of the decontamination wastes in accordance with all applicable Laws and Regulations and the Contract Documents.
5. All temporary fencing, construction tape and barricades shall be removed by the Contractor upon completion of the Work, unless otherwise requested by Terraphase.

-END SECTION-

SECTION 01010

TEMPORARY SERVICES

PART 1 - GENERAL

1.1 WORK SPECIFIED

A. As part of the mobilization activities, the Contractor shall be responsible for providing and maintaining the following temporary services at the Site:

1. Temporary hook-ups to the existing on-site electric service as necessary to support implementation of the Work and servicing temporary facilities to be provided by the Contractor. Alternatively, the Contractor may elect to provide temporary electric service (e.g., portable generators).
2. Adequate temporary lighting for the interior of the structures to illuminate each active work area where adequate lighting is not present, as required by OSHA regulations for illumination contained in 29 CFR 1926.56, Subpart D. All access routes to work areas shall be illuminated to not less than 10 foot-candles when accessing and exiting the work areas. All access routes and work areas, including areas behind the equipment, shall meet the illumination requirements specified in this Section. All work areas where work activities are being conducted shall be illuminated to not less than 20 foot-candles while any work is in progress. Hand-held flashlights shall not be used to satisfy the 10 foot-candle requirement and are not to be used by Contractor personnel during the work (except as needed to setup/breakdown interior temporary lighting equipment or for initial work scoping to determine areas requiring supplemental lighting). All temporary lighting fixtures and globes shall be shatter-resistant.
3. Contractor will be allowed to use existing on-site sanitary services and potable water supply. Location(s) of the sanitary services available for Contractor's use will be specified by Terraphase prior to start of the project.
 - a. The owner may require additional sanitary services due to the pandemic.
4. Dust suppression water and dust control devices including hoses, water storage tanks, spray nozzles, etc., as needed. Contractor will be allowed to use the existing on-site water distribution system as a water source.
5. Other temporary facilities specified elsewhere in the Contract Documents and, if not otherwise specified, as needed for performance of the Work.
6. Vehicular traffic on the sites will be limited to road worthy and registered vehicles with four or more wheels.

B. Contractor will be allowed, but not required, to provide an on-site project trailer to sustain the Contractor's offices for the duration of the project. If provided, the trailer shall be equipped with an anchoring system in accordance with the manufacturer's requirements to prevent overturning due to wind forces. The Contractor shall provide maintenance and servicing of the office trailer and equipment furnished with the office trailer, as required.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. To be specified and supplied by the Contractor.

PART 3 - EXECUTION (NOT USED)

-END SECTION-

SECTION 01100
ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 DEFINITIONS

- A. Asbestos Removal Contractor (ARC) shall be defined as a firm selected by Terraphase that is properly qualified, by means of appropriate licensing and experience, to perform asbestos abatement work specified herein.
- B. Asbestos-containing material (ACM) means any material containing more than one percent asbestos.
- C. Asbestos-containing construction material (ACCM) mean any manufactured construction material which contains more than one tenth of 1 percent asbestos by weight.
- D. Other terms and definitions shall be as specified in Subcontract Agreement between Terraphase and ARC for performance of the work; and applicable regulatory references, including, but not limited to, those listed in Part 1.2 of this document.

1.2 RELATED WORK

- A. The following building materials have been identified as containing asbestos at the Site;
- Brown insulation material located beneath the white gravel capped roofing material was observed to be in good condition, encompasses approximately 27,000 square feet, and is classified as an ACCM.
 - White joint compound material applied to gypsum boards was observed to be in good condition, encompasses approximately 10,000 square feet, and is classified as an Category II non-friable ACM.
 - White 9-inch vinyl floor tiles and associated mastic located in the second-floor storage rooms were observed to be in good condition, encompass approximately 500 square feet, and are classified as Category I non-friable ACMs.
 - Grey gaskets associated with the boiler system was observed to be in good condition, encompasses approximately 3 square feet, and are classified as Category II non-friable ACMs.
 - White hard pack Thermal System Insulation (TSI) was observed to be in good condition, encompasses approximately 10 square feet, and is classified as a Regulated ACM (RACM).

- Black fibrous material located beneath the grey 12-inch vinyl floor tiles located in the elevator was observed to be in good condition, encompass approximately 18 square feet, and is classified as Category I non-friable ACMs.

B. Additional information regarding these materials is included as Attachment A.

1.3 REFERENCES

A. ARC shall comply with all applicable Laws and Regulations, including, but not limited to those referenced below. The most recent version of each regulation shall apply.

1. Federal Regulations:

- 40 CFR Part 61: National Emission Standards for Hazardous Air Pollutants, Subparts A – General Provisions
- 40 CFR Part 61: National Emission Standards for Hazardous Air Pollutants, Subpart M – National Emission Standards for Asbestos
- 40 CFR Part 763: Asbestos, Subpart E – Asbestos-Containing Materials in Schools 40 CFR Part 763: Asbestos, Subpart G – Asbestos Worker Protection
- 29 CFR Part 1926.1101: Asbestos, Safety and Health Regulations for Construction 29 CFR Part 1910.134: Respiratory Protection
- 29 CFR Part 1926, Subpart E: Personal Protective and Life Saving Equipment 29 CFR Part 1926.59: Hazard Communication
- 29 CFR Part 1926, Subpart F: Fire Protection and Prevention
- 49 CFR Parts 171 and 172: Hazardous Substances Transportation: Asbestos

2. California State Regulations:

- 8 CCR, Division 1, Chapter 3.2: California Occupational Safety and Health Regulations
- 8 CCR, Division 1, Chapter 4, Subchapter 4, Article 4: Construction Safety Orders, including Section 1529 - Asbestos
- 22 CCR Division 4.5: Environmental Health Standards for the Management of Hazardous Waste

3. Local Laws, Rules and Regulations:

- Regulations issued by an Air Quality Management District in which the project is located. Other local laws, rules, regulations, and ordinances (e.g., county, town, etc.)

1.4 QUALIFICATIONS

A. ARC shall possess a valid asbestos-abatement contractor's license issued by the State of California Contractor's State License Board under Business and Professions Code Section 7058.5 and be registered with the California Division of Occupational Safety and Health (DOSH, also

known as Cal/OSHA) Contractor Registration Unit under Labor Code Section 6501.5. A copy of the license and evidence of satisfactory training shall be maintained by the ARC at the project site and be available for review by authorities with jurisdiction over the project site.

B. ARC-designated supervisor responsible for onsite supervision of all abatement work shall hold valid Asbestos Supervisor's license issued by appropriate licensing agency. ARC- designated supervisor shall be present at the project site at all times during performance of the work and have full authority to act on behalf of ARC.

C. All personnel engaged in the abatement and/or handling of asbestos-containing materials (ACM) and Asbestos-Containing Construction Material (ACCM) work shall, at a minimum, hold valid Asbestos Worker/Handler license issued by appropriate licensing agency.

1.5 SUBMITTALS

A. At least 5 calendar days prior to initiating the asbestos abatement Work, the Contractor shall submit the following items to Terraphase for review:

1. A list of equipment to be used, along with the catalog sheets.
2. Information pertaining to the proposed Subcontractors (if any), per the requirements specified in Technical Specification Section 00300.
3. The names, qualifications, and certifications of the designated onsite Asbestos Removal Supervisor responsible for onsite supervision of the abatement Work and the primary contact for the Contractor (or for Terraphase, if the Contractor self performs the asbestos abatement) during the performance of the work.
4. Copies of valid asbestos handler and/or asbestos handler supervisor certificates for all personnel engaged in the ACM abatement activities.
5. Proof of appropriate employee training or accreditation acceptable to agencies with jurisdiction over the project site.
6. Final Asbestos Abatement Plans (AA Plans) that presents a detailed approach for completing asbestos abatement activities in accordance with applicable Laws and Regulations. The final AA Plans shall be based on the draft AA Plans submitted by the Contractor as part of the Bid Submittal package, and include any changes, corrections and clarifications that the Contractor and Terraphase will have agreed to during the bid review and contractor selection process. If no changes, corrections and/or clarifications to the draft AA Plans are requested by Terraphase during the bid review and the Contractor selection process, the Contractor shall finalize the existing draft AA Plans without changes. Terraphase reserves the right to request additional changes, corrections and/or clarifications (in addition to those communicated and agreed to during the bid review and the Contractor selection) after award of Contract. The Contractor shall be responsible for determining means and methods for abatement of all ACMs and ACCMs subject to this RFP. At a minimum, the AA Plan shall include the following:

- a. Identification of construction and abatement methods, and a description of proposed material handling procedures to be used to safely abate/remove ACMs and ACCMs subject to this RFP.
 - b. Proposed phasing of the abatement activities, i.e., proposed schedule showing major activities and duration in accordance with specifications.
 - c. Airborne dust/asbestos control equipment and methods to be implemented by the Contractor.
 - d. Documentation of recent DOP (Di-octyl Phthalate) testing (within one year) of all high-efficiency particulate air (HEPA) filtration equipment (hogs, vacuums) to be used during implementation of the Work. Terraphase may request for hogs, vacuums to be tested onsite.
 - e. A map showing proposed staging areas for consumable materials, equipment and waste materials.
 - f. A contingency plan for removing any ACMs and ACCMs that may be encountered during implantation of the Work.
 - g. Proposed waste transporter and proposed waste disposal facility.
7. A Contingency Plan for responding to uncontrolled releases of ACMs.
 8. An Air Quality Monitoring Plan to monitor the breathing zones of personnel involved in the abatement, in accordance with 29 CFR 1926.1101 and all other applicable Laws and Regulations.
 9. The Contractor shall be responsible for complying with all asbestos abatement notification requirements presented in 40 CFR Part 61 and other applicable Laws and Regulations. Copies of the notifications shall be provided to Terraphase prior to the commencement of the abatement work.
 10. The Contractor shall submit the following information to Terraphase on a weekly basis or upon completion of the abatement work, whichever comes first:
 - a. Copies of all transport manifest, trip tickets, and disposal receipts for all asbestos waste material removed from the area during the abatement process.
 - b. Daily copies of work site entry logbooks with information on worker and visitor access.
 - c. Daily written logs documenting the quantity and type of ACMs and ACCMs removed.
 - d. If Contractor intends to apply for a variance from work practices required by applicable Laws and Regulations to a regulatory agency with jurisdiction over the abatement Work, the Contractor shall submit draft variance application to Terraphase for review and approval prior to finalizing the variance application and submission to the regulatory agency.

1.6 DESCRIPTION OF WORK

A. The Contractor (or its ARC Subcontractor) shall provide all labor, equipment, materials, services, training, insurance, regulatory notifications (including notifications, permits, work plans, and variance applications [if any]) and services necessary for the collecting, removal, segregation,

handling, containerization, and proper disposal of all friable and non-friable ACMs and ACCMs that are present at the aboveground structures subject to this RFP.

B. All abatement Work shall be conducted in accordance with this Section; regulations promulgated by the Environmental Protection Agency (EPA); Occupational Safety and Health Administration (OSHA); and other applicable Laws and Regulations including State of California and local regulations.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. To be specified and supplied by the Contractor.

2.2 CONTAINERS

A. The Contractor shall provide United States Department of Transportation (USDOT) approved, leak-tight containers for containerization of waste materials generated as a result of the ACM and ACCM abatement activities. The waste containers shall meet the minimum requirements set forth in 40 CFR 61.50. All containers shall be labeled by the Contractor in accordance with applicable Laws and Regulations.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Personnel shall wear and utilize protective clothing and equipment. The Contractor shall not permit eating, using chewing tobacco, drinking, chewing gum, or applying cosmetics in the regulated area(s). Personnel of other trades shall not be exposed at any time to airborne asbestos at regulated concentrations.

B. All asbestos abatement work shall be performed using a minimum of Level C PPE, which includes but is not limited to use of an air purifying respirator with HEPA cartridge, Tyvek® suit with ankles and cuffs taped to boots and gloves, nitrile gloves and puncture resistant work gloves (two pairs), steel-toed boots, high visibility clothing (e.g. reflective vest, hard hat or nomex, long sleeve work shirts), hearing protection (when required), fall protection (when required), hardhat and task appropriate gloves. All the safety equipment should conform to OSHA's requirements and appropriate NIOSH / ANSI standards.

3.2 QUANTITIES AND MEASUREMENT

A. Information presented in Appendix A shall be used by the Contractor only as an aid in determining types, condition and general location of ACMs and ACCMs that require abatement. The Contractor shall be responsible for determining actual quantities of ACMs, ACCMs, and other materials that require abatement, removal or need to be otherwise addressed regardless of if such

materials are listed in Appendix A or not. Such determination shall be made by the Contractor via direct visual observation and field measurements.

3.3 PREPARATION

A. Contractor shall bear all costs associated with permits, training, licensing, notifications, and all other fees related to Contractor's ability to perform the work specified in this Section. Such costs shall be included in the Contractor's Lump Sum price proposal.

B. Prepare required regulatory notifications for planned asbestos abatement work. The notifications shall be prepared in accordance with applicable regulatory requirements. Prior to submitting the notifications to appropriate regulatory agencies, each notification shall be prepared in DRAFT and first submitted to Terraphase for review. Upon favorable review by Terraphase, each notification shall be finalized by the Contractor and submitted to appropriate regulatory agencies along with applicable fees. All costs associated with preparation and submittal of regulatory notifications and associated regulatory fees shall be included in the Lump Sum Cost.

C. Contractor's Certified Industrial Hygienist (CIH) is responsible for the following:

1. Negative Initial Exposure Assessment: A demonstration by the Contractor, which complies with the criteria in 29 CFR 1926-1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL.
2. Permissible Exposure Limit (PEL): The airborne concentration of asbestos (0.1 fibers/cc) at which the employer will ensure that no employee is exposed over an eight-hour time weighted average. Where the PEL is exceeded the employer will establish and implement a written program to reduce employee exposure to or below the limit by (1) engineering and work practice controls, and (2) use of required proper respiratory protection. No employee will be exposed at any time to airborne concentrations of asbestos in excess of 1.0 fibers/cc during any 30- minute period, which is the excursion limit.
3. Monitor air fiber concentrations inside and outside Negative Pressure Enclosure System (NPES) daily. Daily smoke test each NPES and visually check each for air leaks and that all critical barriers are sealed. Patch any holes or openings immediately. The Contractor or their CIH will perform area air monitoring.
4. Contractor's CIH will ensure and certify that all workers performing asbestos abatement activities will have successfully completed an EPA-approved asbestos training course and have in their possession a valid Asbestos Worker Certificate or Contractor/Supervisor Certification issued by a State of California approved trainer. All certifications must follow the recent Model Accreditation Plan (MAP) provisions (29 CFR 1926.1101(n) and (o)). Contractor will be required to submit a copy of each employee's training records to the Terraphase Representative prior to start of project.
5. All poly sheeting used to construct the NPES must be six-mils thick and fire retardant and will be polyethylene material sized in lengths and widths to minimize the frequency of joints.

Drop sheets need not be made of fire-retardant material if they are not used to construct the negative pressure containment.

6. Warning signs should be used and printed at a minimum as described in 29 CFR 1926.1101 (e) and (k)(7) and any local regulations. Warning signs will be posted at all approaches to regulated areas, and as required by federal, state, regional and local regulations. Signs should be located so that they are clearly visible from twenty (20) feet, so that personnel may read the sign and take the necessary protective steps required before entering the area. Postings will be in English and Spanish, and in any language used by any of the Contractor's employees as the primary language of communication. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. All labels affixed to waste bags will be original adhesive labels. Photocopying of labels and affixing of photocopies to waste bags will not be acceptable.
7. The local exhaust (HEPA filtered) system will be equipped with a pressure regulator/warning device that allows continuous monitoring of system operation to preclude exposure of adjacent unsealed area to asbestos fiber concentrations in excess of 0.01 fibers/cc of air. The pressure differential will be maintained above 0.02 inch of water relative to pressure outside the enclosure. Any malfunction of the local exhaust system will be reported to the on-site Competent Person and will be cause for cessation of asbestos abatement until the cause is discovered and remedied. The Terraphase Representative will be notified immediately.
8. Contractor's CIH will establish emergency and fire exits from the work area. Approved fire extinguisher (Class ABC, multi-purpose, dry chemical type, rated: 4A; 6OBC) will be readily available to workers (maximum travel distance of 75 feet) inside and adjacent to work area(s). Personnel and emergency exits will be clearly indicated on the inside of the containment area. The emergency exit plan will be reviewed by the Terraphase Representative prior to starting setup of containment system.
9. Contractor's CIH will ensure that an encapsulant or fiber lockdown material is applied to all surfaces from which asbestos was removed. Encapsulant will be compatible with the substrate upon which it will be sprayed. Encapsulant will be applied as specified by the manufacturer.

3.4 REMOVAL

- A. Contractor shall remove all friable and non-friable ACMs and ACCMs present at the site, except as provided in Item 3.04-J of this Section.
- B. During and following the removal activities, the Contractor shall containerize and place the removed ACMs and ACCMs into a temporary staging area(s) separate from any other waste material. The staging area(s) shall be constructed such that to shelter the asbestos-containing

waste from the elements (e.g., wind, precipitation, and surface water runoff). The Contractor shall include a description of the proposed design and location of the staging area(s) in the AA Plan.

C. Contractor shall provide daily tally of all ACM and ACCM removed.

D. Contractor shall be responsible for all demolition/dismantling/removal work required to properly access and abate all ACMs and ACCMs subject to this RFP. The Contractor shall be responsible for properly moving all non-asbestos demolition debris out of the work area to allow for asbestos abatement to be properly performed.

E. Any materials deemed to be asbestos contaminated, as determined by Terraphase at its sole discretion, prior to the start of the work, or as a result of the work, shall be treated as such and disposed of properly by the Contractor at no additional cost to Terraphase or the Owner. This shall include, but be not limited to, wood substrates that have been stained with asbestos-containing tar, glue, mastic, multiple layers of roofing materials and floor tiles, etc.

F. The Contractor shall remove multiple layers of ACMs and ACCMs (e.g., multiple layers of roofing materials, floor tiles) at no additional cost to Terraphase or the Owner. No Change Order(s) will be considered nor issued for addressing multiple layers of ACMs and/or ACCMs regardless if these layers can be identified prior to initiating the abatement work or not. The contractor is encouraged to use abatement methods that address multiple layers and/or types of ACMs/ACCMs with a minimal or no additional effort, and minimize manual handling of materials prior to, during and following the abatement.

G. The Contractor shall remove all non-asbestos containing floor tiles associated with ACM and ACCM mastic, and manage the floor tiles as if they contained the same amount of asbestos as the associated mastic.

H. The Contractor shall remove all wall systems (e.g., sheetrock/drywall/studs) associated with ACM and ACCM joint compound, and manage the removed walls systems as if they contained the same amount of asbestos as the associated joint compound.

I. The Contractor shall remove ACM and ACCM pipe insulation and other ACMs/ACCMs that may be applied to process piping exterior without removing piping components, opening the pipe runs, or damaging/puncturing the piping. Should a pipe be accidentally opened/punctured during performance of the abatement work, the Contractor shall immediately notify Terraphase of this fact and take a prudent action as required to protect employees, general public and property from potential releases of pipe contents.

J. The Contractor is not required nor permitted to remove asbestos-containing gaskets from intact process piping and from process-related pumps that are connected to intact piping. This exclusion does not apply to pipes and pumps that are already opened and verified not to contain any residual liquids, as determined by Terraphase at its sole discretion.

3.5 AIR QUALITY MONITORING

A. The Contractor CIH shall be responsible for all personal air monitoring as required by applicable Laws and Regulations in place at the time of Contract award and consistent with Item 3.03-Cb. The Contractor shall be responsible for all costs of the personal air monitoring and associated laboratory analyses.

B. Terraphase and the Owner may elect to provide a DOSH certified Site Surveillance Technician (CSST), working under the direction of a Certified Asbestos Consultant (CAC), who will be responsible for observing implementation of the abatement Work and conducting air monitoring. Terraphase will be responsible for all costs associated with the perimeter air monitoring, including associated laboratory analyses, and observing implementation of the Work by the CSST. Terraphase will also be responsible for costs associated with performance of one post-abatement clearance monitoring per abatement area and associated laboratory analyses. Costs associated with any additional post-abatement clearance monitoring and laboratory analyses (if needed) shall be as specified in Item 3.06-B of this Section.

C. If during removal activities, air quality regulatory levels related to asbestos are exceeded, the Contractor shall immediately take all appropriate measures to reduce the concentration of airborne asbestos (e.g., wetting), at no additional cost to Terraphase and the Owner.

D. The Contractor shall provide the CSST with unobstructed access to all abatement areas at all times.

E. The Contractor shall provide electrical power and water as required to support implementation of the abatement and air monitoring activities.

3.6 QUALITY CONTROL

A. The Contractor shall be responsible for achieving post-abatement clearance criteria.

B. Should the work area fail the clearance monitoring, as determined by the CSST, the Contractor shall repeatedly clean the work area at no additional cost to Terraphase and the Owner. The Contractor shall pay for all additional cleaning, testing, inspections and laboratory analyses until the clearance is achieved as determined by the CSST.

C. Area Clearance Sampling: The average of all clearance air samples must be less than 0.01 fibers/cc of air via NIOSH 7400 Phase Contrast Microscopy (PCM). The CSST will collect "clearance" air samples at the conclusion of the asbestos abatement activities for each of the NPES or containment areas for this project. Unless otherwise directed by the CAC, PCM analysis will be used for all areas where removal will occur. The CSST will determine the number and placement of samples.

3.7 WASTE TRANSPORTATION AND DISPOSITION

A. The Contractor shall be responsible for proper segregation, transportation and disposition of all friable and non-friable asbestos-containing waste generated during implementation of the Work at an approved facility licensed to accept this type of waste.

B. The Contractor shall submit to Terraphase for review and approval names and contact information for proposed waste transporters and disposal facilities. All waste transporters proposed by the Contractor are subject to approval by Terraphase and the Owner. Terraphase and the Owner reserve the right to reject any or all transporters at their sole discretion. Upon request, the Subcontractor shall provide Terraphase with copies of proposed transporter licenses and/or certifications.

C. The Contractor shall provide Terraphase with copies of fully executed waste manifests, bills of lading, scale tickets, and other documents pertaining to waste transportation and disposition, as requested by Terraphase. At a minimum, the waste manifests and bills of lading shall show quantity of waste materials accepted by a final disposal facility and a certification that the waste has been disposed of in accordance with applicable regulations and standards.

-END SECTION-

SECTION 01110

LOOSE LEAD-CONTAINING PAINT REMOVAL

PART 1 - GENERAL

1.1 DEFINITIONS

A. Lead Based Paint (LBP): Paint, surface coating that contains lead equal to or exceeding one milligram per square centimeter (1.0 mg/cm²) or 0.5% by weight. Any paints or coatings with detectable lead concentrations not meeting the definition of an LBP are referred to as Lead Containing Paint (LCP)

B. Loose Paint: Flaking, peeling, separated paint that is not properly adhered to a substrate to which it was originally applied. This includes peeling/flaking paint that is still partially attached to substrate surface(s), and paint that has been separated from substrate surface(s) to which it was originally applied.

1.2 RELATED WORK

A. The following LBP and/or LCP have been identified at the Site;

- Orange paint applied to the exterior roof mounted HVAC system was observed to be intact and is classified as a LCP.
- Orange paint applied to the exterior roof mounted HVAC system I-beams was observed to be intact and is classified as a LBP.
- White paint applied to the walls located in room B207A was observed to be intact and is classified as a LCP.
- Gray paint/coating applied to the ceramic wall tiles in the second-floor restrooms was observed to be intact and is classified as a LCP.
- Brown paint applied to the metal door frames was observed to be intact and is classified as a LBP.
- Blue paint applied to the wood doors was observed to be intact and is classified as a LCP.
- Orange paint applied to the wood door was observed to be intact and is classified as a LBP.
- White paint applied to the concrete masonry unit (CMU) walls located in the paint shop was observed to be intact and is classified as a LCP.
- Red paint applied to the stucco wall in the paint shop was observed to be intact and is classified as a LBP.

- Green paint applied to the wood door of the paint shop was observed to be intact and is classified as a LBP.
- White paint applied to the metal handrail associated with the stairway was observed to be intact and is classified as a LCP.

B. Additional information regarding these materials is included as Attachment A.

1.3 REFERENCES

A. The Contractor shall comply with all applicable Laws and Regulations, including, but not limited to those referenced below.

1. Federal Laws and Regulations:

- 29 CFR Part 1926.21: Safety Training and Education
- 29 CFR Part 1926.55: Gases, Vapors, Fumes, Dusts, and Mists 29 CFR Part 1926.62: Lead
- 29 CFR Part 1926.65: Hazardous Waste Operations and Emergency Response 29 CFR Part 1926.103: Respiratory Protection
- 40 CFR Part 260: Hazardous Waste Management System: General 40 CFR Part 261: Identification and Listing of Hazardous Waste
- 40 CFR Part 263: Standards Applicable to Transporters of Hazardous Waste 49 CFR Parts 171 and 172: Hazardous Substances Transportation

2. California Laws and Regulations:

- Title 8 CCR, Chapter 4, Subchapter 4, 1532.1- Lead in Construction
- Title 22 CCR, Chapter 11, Division 4.5 – Identification and Listing of Hazardous Waste

3. Local Laws, Rules and Regulations:

- Regulations issued by an Air Quality Management District in which the project is located. Other local laws, rules, regulations and ordinances (e.g., county, town, etc.)

1.4 QUALIFICATIONS

A. The Contractor shall demonstrate its ability to perform and complete all work required under this Section by submitting a statement of its experience and the experience of any Subcontractors that the Contractor intends to use to perform the work (of any part thereof).

B. All personnel directly engaged in loose paint removal and/or handling shall be trained by state-accredited training providers and certified by California Department of Health Services.

1.5 WORK SPECIFIED

A. The objective of the paint removal work is to remove loose paint that exhibit relatively high concentrations of lead. The Contractor shall remove loose paint from locations specified in Summary of Bulk Lead Sampling Results table included in Appendix A.

B. Loose paint shall be removed prior to initiating any intrusive work activities that could disturb such loose paint and potentially result in uncontrolled discharges of loose paint and/or paint-related dust to the surrounding media or adjacent building material surfaces.

1.6 SUBMITTALS

A. At least 5 calendar days prior to initiating the paint removal work, the Contractor shall submit the following items to Terraphase for review:

1. An Employee Exposure Assessment as required by 29 CFR Parts 1926.62 (d) (lead) and applicable state regulations/standards.
2. Written compliance program prepared in accordance with 29 CFR Parts 1926.62 (e) and applicable state regulations/standards.
3. Copies of valid certificates for each worker engaged in the paint removal and handling activities. In addition, if the state/local regulations require the firm conducting the paint removal to be licensed, documentation of licensing must also be provided at the Work site.
4. A list of equipment and materials to be used, along with the catalog sheets.
5. A description of engineering controls that the Contractor proposes to utilize to mitigate potential migration of particles beyond the work area and an uncontrolled release of loose paint/debris to adjacent environmental media (e.g., soil, water).

B. Within 2 weeks of completion of the loose paint removal, the Contractor shall submit to Terraphase copies of all project records as required under 29 CFR 1926.62 (n) and applicable state regulations/standards.

C. The Contractor shall propose in writing to Terraphase, the means and methods of paint removal before beginning the work. The Contractor shall not begin work until Terraphase and Peralta approve the Contractor's work plan.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. To be specified and supplied by the Contractor.

2.2 CONTAINERS

A. The Contractor shall provide United States Department of Transportation (USDOT) approved containers for containerization of waste materials generated as a result of the loose paint removal

activities. All containers shall be labeled by the Contractor in accordance with applicable Laws and Regulations.

PART 3 - EXECUTION

3.1 PREPARATION

A. The Contractor shall bear all costs associated with permits, training, licensing, notifications, and all other fees related to the Contractor's ability to perform the work specified under this Section.

3.2 REMOVAL

A. The Contractor shall provide all labor, equipment, materials, and services necessary for removal, handling, and containerization of loose paint from locations specified in Summary of Bulk Lead Sampling table included in Appendix A; and placing the loose paint in appropriate containers for off-site disposal as an assumed Resource Conservation and Recovery Act (RCRA) hazardous waste.

B. Poly drop cloths shall be installed below the lead work areas to prevent the spread of paint chips into Site soils or unaffected areas of the buildings.

C. All polyethylene material sheeting must be six-mils thick, fire retardant and, sized in lengths and widths to minimize the frequency of joints. Drop sheets need not be made of fire-retardant material if they are not used to construct the negative pressure containment.

D. The Contractor shall remove the designated loose paint to the satisfaction of Terraphase. Loose paint removal activities shall be conducted in accordance with 29 CFR Parts 1926.62 and 1926.1127 and other applicable Laws and Regulations.

E. The Contractor shall conduct the paint removal activities in a manner that minimizes generation of airborne dust (e.g., vacuuming the building surfaces with HEPA vacuum, using wet methods). The use of burning and/or open flame devices will not be allowed. Removed paint shall be collected and placed into USDOT-approved containers.

F. Following the completion of loose paint removal activities, ground areas and other surfaces adjacent to the paint removal areas shall be cleaned of loose paint, dirt, and debris to the satisfaction of Terraphase. Loose paint, dirt and debris shall be collected and placed into USDOT approved containers for subsequent transportation and off-site disposal by the Contractor.

G. All used disposable equipment, including disposable clothing, filters, polyethylene sheeting, etc., that contacts the loose paint shall be collected and placed into USDOT approved containers for subsequent transportation and off-site disposal together with collected paint.

H. The Contractor shall implement engineering controls and barriers to mitigate release of loose paint beyond Work limits. The engineering controls may include, but are not limited to, installation of tarps, barriers, etc.

I. The Contractor will not be required to remove paints that are properly adhered to painted material surfaces.

J. Criteria for clearance will consist of visual observation(s) conducted by the Owner's representative or third-party consultant.

3.3 DUST CONTROL

A. Air monitoring and fugitive dust suppression activities shall be implemented by the Contractor in accordance with applicable Laws and Regulations and as specified in Technical Specification 00700 – General Conditions.

B. In addition to the requirements specified in Item 3.03-A of this Section, real-time airborne dust monitoring shall be conducted by the Contractor during all paint removal activities that have a potential for generating airborne dust. If any action levels, as specified in the site-specific HASP, are exceeded, the Contractor shall immediately take appropriate measures to reduce airborne dust emissions to acceptable levels.

-END SECTION-

SECTION 01120

REGULATED PCB ABATEMENT

PART 1 - GENERAL

1.1 WORK SPECIFIED

A. Bulk sampling and analysis have determined that polychlorinated biphenyls (PCBs) are present in select building materials, including at levels potentially greater than or equal to 50 ppm (parts per million).

B. The removal and disposal of building materials with PCBs is regulated by the Toxic Substances Control Act (TSCA) and Code of Federal Regulations 40 CFR 761.

C. Building materials (typically caulk) with PCB concentrations equal to or greater than 50 ppm are regulated as PCB Bulk Product Waste. Building materials contaminated by PCB Bulk Product Waste, with PCB concentrations equal to or greater than 1 ppm, are regulated either as PCB Remediation Waste or as PCB Bulk Product Waste if the abatement plan states the intention to dispose of the PCB Bulk Product Waste (caulk) and the adjacent contaminated building materials together.

D. This section establishes requirements for the removal, segregation, management, and disposal of: (1) PCB Bulk Product Waste in the forms of select sealants (caulk, paint, or mastic), select building materials impacted by PCB Bulk Product Waste caulk, paint, or mastic, and associated debris; (2) PCB Remediation Waste in the form of select building materials impacted by PCB Bulk Product Waste (and associated debris) and PCB Cleanup Waste; (3) Other PCB-containing Waste, including caulk, paint, or mastic containing <50 ppm PCBs; (4) common construction debris, segregated from all PCB-containing wastes, either restricted from reuse or unrestricted from reuse (recyclable) based on PCB content.

E. The Contractor shall furnish all labor, materials, services, training, insurance, and equipment as needed to complete removal, segregation, management, and disposal of the materials listed above as indicated herein. The Contractor shall follow all Federal, State, and local ordinances, regulations, and rules pertaining to removal, storage, transportation, and disposal of PCBs.

F. Summary of Bulk PCB Sampling table located in Attachment A, summarize where PCB Bulk Product Waste and associated PCB Remediation Waste have been identified to be managed under this section.

G. The Contractor shall be responsible for verifying all quantity estimates in preparation of their bids, including the location and conditions of all PCB-containing materials to be abated and disposed of under this contract. No additional compensation and/or contract time shall be granted to the Contractor for failure to perform this requirement.

1.2 RELATED WORK

- A. The following building materials have been identified as containing PCBs at the Site;
- Gray seam caulk applied to the base of the concrete walls was observed to be intact and contains trace amounts of PCBs.
 - Gray seam caulk applied to the CMU restroom wall was observed to be intact and contains trace amounts of PCBs.
 - While PCBs were not detected above the laboratory reporting limit in the grey mastic the reporting limit, 97 mg/kg, was almost double the regulatory threshold for PCBs in building materials of 50 mg/kg. Because it cannot be verified that PCBs are not present above 50 mg/kg, it is recommended that this material be abated prior to the demolition activities. The gray mastic was observed to be intact, encompasses approximately 12 linear feet, and is assumed to contain PCBs
- B. Additional information regarding these materials is included as Attachment A.

1.3 DEFINITIONS

- A. United States Environmental Protection Agency (USEPA): Agency responsible for implementing PCBs Manufacturing, Processing, Distribution in Commerce, and Use Prohibition, 40 CFR 761 ("TSCA") Code of Federal Regulations (CFR).
- B. PCB Bulk Product Waste: Building materials (e.g. paint or caulk originally containing total PCBs at concentrations equal to or greater than 50 parts per million (ppm). See also 3.02 WASTE MANAGEMENT.
- C. PCB Cleanup Waste: PCB-containing solid and liquid wastes generated during the cleanup of PCB Bulk Product Waste and PCB Remediation Waste. See also 3.02 WASTE MANAGEMENT.
- D. PCB Remediation Waste: Building materials with PCB concentrations equal to or greater than either 1 ppm (porous materials) or 1 ug/100 cm² (non-porous materials) that have become contaminated due to adjacent PCB Bulk Product Waste. See also 3.02 WASTE MANAGEMENT.
- E. Other PCB-containing Waste: Waste that contains >1 ppm but <50 ppm PCBs. Other PCB-containing Waste includes select PCB-containing caulk that has not been determined to be PCB Bulk Product Waste or PCB Remediation Waste. See also 3.02 WASTE MANAGEMENT.

1.4 GENERAL REQUIREMENTS

- A. All PCB removal and disposal work referenced herein shall be performed in accordance with a Health and Safety Plan (HASP) developed by the Contractor in accordance with Cal/OSHA regulations. The contractor shall provide proof of training for all staff that will disturb PCB-containing materials or that will work in work areas where PCB-containing materials are disturbed. All workers entering the controlled work area during the disturbance of PCB-containing materials, including during remediation of PCB-containing materials or during the cleanup of PCB-contaminated dust and debris shall: have current asbestos abatement worker training; be supervised by a qualified

asbestos abatement competent person; and have received PCB-awareness training specific for this job site. Such PCB-awareness training shall include at a minimum: materials that may contain PCBs, routes of exposure, health risks associated with exposures to PCBs, selection and use of personal protective equipment, work practices, and spill response measures.

B. Some materials to be managed in accordance with this specification also contain asbestos or lead. Requirements for managing ACMs are specified in the Section 01100 and LBPs are specified in Section 01110 .

1. Both specifications address health and safety, work zone containment, work zone posting, waste storage, waste shipping papers, waste transportation, and waste disposal.
2. If there is a conflict, the most stringent requirements generally shall apply.
3. Any exception to the PCB specification (this section) must be submitted by the Contractor and approved by the Owner before the exception work has begun.

C. The Contractor shall provide all personnel with PPE, protective clothing, and monitoring equipment consistent with the levels of protection required for each type of work. Workers shall wear, at a minimum, 1/2-face respirators with P100 filters and organic vapor cartridges, water resistant Tyvek-type suits with boot covers, rubber gloves, and eye protection when disturbing PCB Bulk Product Waste, PCB Remediation Waste, PCB Cleanup Waste, and Other PCB-containing Waste unless a job-specific exposure assessment is performed to demonstrate that a reduction in PPE is appropriate.

D. No power tools (saws, chipping hammers, grinders, wire wheels, etc.) will be used to disturb PCB Bulk Product Waste or PCB Remediation Waste materials unless removal is performed within a regulated work area or with additional containment provisions as deemed necessary on site (i.e. drop cloths) with HEPA vacuum attachments on the power tools.

E. All equipment and tools shall be provided to the Site free of contamination. The Owner prohibits from the Site any equipment that in his/her opinion has not been thoroughly decontaminated prior to arriving at the Site. Any decontamination of the Contractor's equipment prior to arrival at the Site shall be at the expense of the Contractor. The Contractor is prohibited from decontaminating equipment on Site which was not thoroughly decontaminated prior to arrival.

F. The work area will be demarcated with caution tape and signage at a distance to keep unauthorized workers and visitors out of the work area. A tool drop zone and personal decontamination facility will be established contiguous to the work zone. Waste stream pathways will be designated. A clean zone will be established.

G. When working on the interior or exterior of the Site building, containments and/or regulated areas will be required to be established for removal of the caulks or mastics (PCB Bulk Product Waste or Other PCB-containing Waste) and associated PCB-containing materials (PCB Bulk Product Waste and/or PCB Remediation Waste).

H. The Contractor shall provide all drums, overpack drums, storage containers, and related products and materials required for collecting, storing, and transporting the PCB-containing waste in compliance with DTSC, USEPA, and U.S. Department of Transportation (DOT) requirements. All drums and other waste packaging shall meet the requirements of DOT 49 CFR 173.

I. Contractor shall continually assess weather conditions and stop disturbance of PCB-containing materials if contaminants can be spread outside of the controlled work area by wind or rain.

1.5 REGULATORY REQUIREMENTS

A. The work of this section shall meet the applicable waste removal and disposal requirements under 40 CFR 761 and be in accordance with other applicable federal, state, and local regulations, laws, codes, and ordinances governing the removal, handling, transportation, and disposal of materials managed under this section, including USEPA requirements.

B. The Contractor shall obtain all federal, state, and local permits required for the removal, handling, transport, and disposal of materials managed under this section. The Contractor shall adhere to all permit requirements.

C. The Contractor shall document that the disposal facility proposed have all certifications and permits as required by federal, state, and local regulatory agencies to receive and dispose of the materials managed under this section.

D. The following guidance documents are cited for the information and guidance. The list below is not all-inclusive. The Contractor shall be responsible for a thorough knowledge and full implementation of all requirements for removal, transportation, and disposal of the materials managed under this section.

1. Contractors Handling PCBs in Caulk During Renovation; USEPA, EPA-747-F-09-004.
2. Preventing Exposures to PCBs in Caulking Material; USEPA, EPA-747-F-09-005 (September 2009).
3. Current Best Practices for PCBs in Caulk Fact Sheet - Disposal Options for PCBs in Caulk and PCB-Contaminated Soil and Building Materials (Last Updated: December 2012).

1.6 SUBMITTALS

A. The following submittals are required for review and approval by the Owner's Representative on/or before the Pre-Construction Meeting:

1. HASP: Developed in accordance with Cal/OSHA regulations and other applicable federal, state, and local regulations;
2. Licenses and Permits: Licenses and permits required for complying with any applicable federal, state and local laws, codes, policies and regulations in connection with the work outlined in this section;

3. Waste Profiles: All waste profiles, applications, and questionnaires, prior to forwarding them to the party requiring these documents;
4. Materials Product Data: Provide safety data sheets for hazardous materials (e.g. solvents) used in the removal and disposal of PCB-containing materials.
5. Work Plan: Include all pertinent information relating to the work outlined in this section.
 - a. Name(s), address(es), and contact(s) of subcontractors retained for the work outlined in this section.
 - b. Detailed description of work activities and progress schedule for each phase of the work outlined in this section.
 - c. Description of engineering controls and procedures used to minimize exposure to PCBs and to mitigate migration of dusts and contaminants generated by each type of work outlined in this section.
 - d. Description of means and methods for removal and disposal of the PCB-containing materials.
 - e. Proposed methods of waste storage, disposal, and transportation.
 - f. Name(s), address(es), and contact(s) of hazardous waste transporter(s) that will transport hazardous waste from the Site to a TSCA-approved disposal facility, including EPA identification number and proof of permit, license, and authorization to transport hazardous waste in all affected states.
 - g. For each PCB-containing waste stream, name(s), address(es), and contact(s) of disposal facility, which will be accepting the PCB-containing waste, and a letter of acceptance indicating that the facility will accept the specific removed materials associated with the work outlined in this section.

B. Work Method Changes: Owner and Owner's Representative approval is required for all modifications to methods, procedures, and design, which may be proposed by the Contractor. Any such modifications or substitutions to methods, procedures, or design shall comply with applicable regulations. Contractor shall submit the proposed modification or substitution for review and approval.

C. In addition to the items required by other sections of the Contract Documents, the following submittals are required for final payment:

1. Waste manifests and any other documents required to transport and dispose of the items identified in this section.
2. Completion Report: Report that summarizes and documents the removal and disposal of all materials associated with activities outlined in this section. This includes the Certificate of Disposal for each shipment of manifested PCB waste.

1.7 QUALITY ASSURANCE

A. Owner's Representative will visually inspect areas of removal to confirm adequate removal of PCB-containing materials and have the opportunity to collect air samples, wipe samples, and/or building material samples if necessary, to assist in the determination of the adequacy of removal.

1.8 COORDINATION

- A. Extend full cooperation to the Owner in all matters involving the use of the Site and Owner's facilities. At no time shall the Contractor cause or allow to be caused conditions that may cause risk or hazard to the general public or conditions that might impair safe use of the Site.
- B. Provide Site access to the USEPA, DTSC, other regulatory agency, or Owner's Representative upon request.
- C. Provide access for inspection to all work areas by the Owner's Representative through all phases of the work. The Contractor shall provide all ladders, lifts (with trained operator), or other equipment necessary in order for the Owner's Representative to perform inspection, sampling, and approval of work as outlined by this section.
- D. Owner and Owner's Representative will prepare Removal and Disposal Plans in accordance with 40 CFR 761 for USEPA review and approval. This section has been developed to reflect the anticipated requirements of USEPA approved Removal and Disposal Plans.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. All materials and equipment proposed to be used on this project shall be subject to the acceptance of the Owner and Owner's Representative. The Contractor shall comply with local, state, and federal regulations pertaining to the selection and use of materials and equipment on this project.
- B. Warning Signs and Labels - Work areas shall be properly demarcated and posted utilizing signs and labels in accordance with Cal/OSHA, TSCA, and USDOT requirements.
- C. Fire retardant polyethylene sheet shall be in roll size to minimize the frequency of joints, with factory label indicating four (4) or six (6) mil thickness.
- D. Tape (or equivalent) capable of sealing joints in adjacent polyethylene sheets and for the attachment of polyethylene sheets to finished or unfinished surfaces must be capable of adhering under both dry and wet conditions.
- E. Containers for storage, transportation and disposal of PCB-containing waste material shall be impermeable and watertight.
- F. Air filtration devices and vacuum units shall be equipped with HEPA filters.

PART 3 - EXECUTION

3.1 ABATEMENT OF REGULATED PCB CONTAINING MATERIALS

- A. The Contractor is informed that the renovation will involve the disturbance of building components that contain PCBs. The intent of this section is to identify for the Contractor where

PCBs have been confirmed to exist and to list applicable regulatory responsibilities the Contractor shall comply with related to PCB-containing materials in order to perform the demolition work including the removal and disposal of PCB-containing building materials.

B. All PCB Bulk Product Waste, PCB Remediation Waste, and Other PCB-containing Waste described in this Section, a site-specific USEPA-approved Removal and Disposal Plan, and/or other Owner-supplied scope document or drawing shall be removed and disposed in accordance with 40 CFR 761, the USEPA-approved Plan, and this SECTION.

C. The removal and disposal of PCB Bulk Product Waste, PCB Remediation Waste, and Other PCB-containing Waste shall be performed in accordance with the following minimal requirements:

1. Temporary fences, barriers or other controls shall be installed around the active work areas to establish the "Construction Zone" and keep the public out;
2. A "Regulated Area" shall then be established within the Construction Zone that demarcates the work area utilizing caution tape and appropriate signage;
3. The "Regulated Area" shall be established at a sufficient distance to keep nonauthorized personnel out of the work area;
4. Polyethylene sheeting shall be placed on the ground and secured to the Site building;
5. A remote decontamination unit shall be established directly adjacent to the "Regulated Area";
6. When working on the building exteriors:
 - a. All doors, windows and/or vents of occupied buildings located within fifty feet of where active abatement is taking place shall be closed and sealed with two (2) layers of six (6) mil polyethylene sheeting and duct tape;
 - b. All air conditioner and/or HVAC intakes of occupied buildings located within 50 feet of where active abatement is taking place shall be shut off and sealed with six (6) mil polyethylene sheeting and duct tape;
 - c. Monitor interiors of occupied buildings as work progresses. If observations made as work progresses indicate that dust is migrating to the interior of an adjacent occupied building, work will be immediately suspended until corrective actions are implemented to control dust migration;
7. Remove all caulk containing PCBs >1 ppm with hand tools.
8. Power tools may be used to remove caulk if removal is performed within a contained area with HEPA vacuum attachments on the power tools.
9. All ground surfaces within the "Regulated Area" shall be cleaned of all caulk, mastic, and associated debris at least daily. Monitor areas adjacent to the "Regulated Area" for any release of dust or debris from the "Regulated Area". Remove any dust or debris when observed and at least daily.

10. All surfaces where PCB-containing caulks and mastics are to be removed for disposal shall be cleaned using hand tools and HEPA vacuums until no three-dimensional caulk is visible on the surfaces. If the surface (concrete) from which caulk has been removed is designated for recycling (reuse), the surface will then also be double wiped with cloths moistened with hexane (or other acceptable solvent).
11. All removed caulks and associated debris shall be placed in double six (6) mil disposal bags or alternative methods that prevent loss or spilling of the waste as it is transported from the removal location to the Waste Storage Area for disposal. All wastes shall be removed from the Construction Zone at the end of each work shift;
12. All disposable tools, PPE, polyethylene sheeting and other materials shall be placed in six (6) mil disposal bags and transported to the Waste Storage area. All wastes shall be removed from the Construction Zone at the end of each work shift;
13. Upon completion of any caulk removal, a visual inspection shall be performed by the Owner's Representative to ensure PCB-containing caulk and associated debris have been properly removed. The Owner's Representative shall have the opportunity to inspect visually, to collect air, wipe, or building material samples if necessary, and to require additional work if the removal of caulk and/or debris is incomplete.
14. Proceed with work only after unsatisfactory conditions have been corrected.

D. In some locations, PCB Bulk Product Waste (caulk) has impacted adjacent porous substrates, and some sections of affected porous substrates are to be removed and disposed as PCB Remediation Waste. The building materials designated as PCB Remediation Waste are listed in the USEPA-approved Removal and Disposal Plan. Refer to all applicable requirements in C. above, and the following additional minimal requirements apply:

1. PCB Remediation Waste is to be removed and disposed as containing greater than 50 ppm PCBs.
2. All PCB Remediation Waste will be segregated from non-PCB-containing waste.
3. Engineering controls, including HEPA vacuum attachments and/or wet methods, must be used during mechanical work (e.g. chipping, cutting) and during the removal of the PCB Remediation Waste and associated debris.
4. All mechanical work performed on porous building materials using power tools must be done within a regulated work area or with additional containment provisions as deemed necessary on site (i.e. drop cloths).
5. The cuts are to be made in non-PCB-containing sections of the porous building materials, but the porous building materials are assumed to contain crystalline silica so worker exposure to crystalline silica must be monitored and controlled.
6. Contractor must comply with 8 CCR 1530.1, 8 CCR 5155, and 8 CCR 5144 with regard to removal (i.e. mechanical work) of porous building materials, including concrete and stucco.

7. Contractor must comply with the Storm Water Pollution Prevention Plan (SWPPP) and the Spill Prevention and Control Plan (SPCP) and/or equivalent plans as required to prevent the cross-contamination of PCBs into soil, groundwater, or body of water by PCBs from the site.
- E. Manage all wastes generated in accordance with 40 CFR 761 and as detailed in Article 3.02 herein.

3.2 WASTE MANAGEMENT

- A. All waste management will be in accordance with applicable local, state and federal regulations. All costs associated with handling, transport and disposal of all waste material generated on this project shall be borne by the Contractor.
- B. The Contractor is responsible for ensuring that all wastes are Packaged and sized to meet final waste disposal facility requirements and for obtaining additional data that the waste disposal facility may require to accept waste, except as noted in this section.
- C. The wastes generated during the work shall be classified as follows:
1. PCB Bulk Product Waste: Caulk and caulk debris waste known or assumed to have PCB content equal to or greater than 50 ppm. PCB Bulk Product Waste also includes materials adjacent to caulk that are designated for disposal as PCB Bulk Product Waste in the USEPA Plan and any debris incidentally generated from those materials during removal.
 2. PCB Remediation Waste: Materials identified as PCB Remediation Waste because of known or assumed contamination from adjacent PCB Bulk Product Waste. PCB Remediation Waste also includes all PPE from employees working in the regulated work areas, containment materials, and tools (if not decontaminated) used during the disturbance of any PCB-containing materials (>1 ppm), and all debris generated during disturbance of areas identified as PCB Remediation Waste.
 3. Other PCB-containing Waste: Waste that contains >1 ppm but <50 ppm PCBs. Other PCB-containing Waste includes select caulk that contains greater than 1 ppm PCBs but has not been determined to be PCB Bulk Product Waste or PCB Remediation Waste.
 4. Some PCB-containing materials also contain asbestos and/or lead. These materials are detailed in tables included as Attachment A.
 5. All waste must be removed and disposed in compliance with both its PCB waste category and its asbestos waste category.
 6. A Uniform Hazardous Waste Manifest is required for the removal from the premises and disposal of PCB Bulk Product Waste and PCB Remediation Waste.
 7. Waste containers shall be placarded as containing PCB Waste (and Asbestos Waste if appropriate) with markings meeting the USEPA requirements and California requirements.

8. Wastes shall be disposed of in accordance with 40 CFR 761 (and NESHAP) at a licensed facility that will receive and retain the designated category of waste: PCB Bulk Product Waste, PCB Remediation Waste, or Other PCB-containing Waste, including the asbestos content for each specific waste stream.

D. Non-PCB-containing materials and wastes shall be kept separate from PCB-containing materials and wastes. PCB-containing materials and wastes that contain asbestos shall be kept separate from PCB-containing materials and wastes that do not contain asbestos.

E. All tools and equipment that are not or cannot be decontaminated with a double wipe with a solvent wetted rag in accordance with 40 CFR 761.79(c) shall be disposed as PCB Remediation Waste.

3.3 WASTE STORAGE

A. A secure fenced area with proper signage will be constructed around the Waste Storage Area to restrict public access.

1. Waste container(s) shall be stored in accordance with 761.65(c) and labeled in accordance with CFR 761.40. Access to containers shall be controlled via a fixed tarp.
2. When not in use, containers shall be closed by means to prevent water infiltration when not being loaded.
3. All waste containers shall be within a secured locked fenced area.
4. All solid waste containers shall be placed on-site at a location approved by the Owner. This area shall be placarded as containing PCB Waste with markings meeting the USEPA requirements of 40 CFR 761.40 and 761.45 and any California requirements.

3.4 SHIPPING PAPERS

A. A Uniform Hazardous Waste Manifest is required for removal from the premises and disposal of materials categorized as PCB Bulk Product Waste or PCB Remediation Waste.

1. Each manifest, bill of lading, or other applicable documentation, shall note the truck registration number, state of registration, name of driver, and date of removal of material from the site.
2. The Contractor shall comply with the RCRA Hazardous Waste Manifest policies. One USEPA Identification Number shall be used for all hazardous waste management associated with this section.
3. The Owner will be designated as Generator and will sign all manifests and waste profile applications or questionnaires.

B. A copy of all shipping papers demonstrating waste's final disposition shall be provided to the Owner.

3.5 TRANSPORT OF CONTAMINATED MATERIAL

- A. No PCB-containing waste shall be transported off-site until all disposal facility documentation has been received, reviewed, and accepted by the Owner.
- B. All hauler(s) shall be licensed in all states affected by transport.
- C. The Contractor shall be responsible for inspecting the access routes for road conditions, overhead clearance, and weight restrictions, and shall provide traffic control when needed.
- D. The Contractor shall be responsible for any and all actions and costs necessary to remedy situations involving material spilled in transit or involving debris, mud, and/or dust tracked or otherwise released offsite. This cleanup and other ancillary activities shall be accomplished at the Contractor's expense.
- E. Trucks and containers shall be covered during transport as required by applicable law.

3.6 SPILL RESPONSIBILITY

- A. The Contractor is solely responsible for any and all spills or leaks during the performance of work under this contract, which occur as a result of or are contributed to by the actions of its agents, employees or subcontractors. Such spills or leaks shall be cleaned to the satisfaction of the Owner or its representative, and in a manner that complies with applicable federal, state and local laws, codes, policies and regulations. The spill cleanup shall be at no cost to the Owner.
- B. The Contractor shall report all such spills or leaks, regardless of their quantity, to the Owner immediately upon discovery. A written follow-up report shall be submitted to the Owner as soon as possible, but not later than 24 hours after the initial telephone report. The written report shall be in narrative form and, at a minimum, include the following:
 - 1. Description of item spilled (including identity, quantity, manifest number, etc.);
 - 2. Exact time and location of spill, including a description of the area involved;
 - 3. Containment procedures initiated; and
 - 4. Description of cleanup procedures employed or to be employed, including location of disposal of spill residues, and corrective measures to prevent recurrences.

3.7 DECONTAMINATION PROCEDURES

- A. General: Furnish labor, materials, tools, and equipment for decontamination of all personnel, equipment and supplies that enter the "Regulated Area" or are otherwise exposed to PCB-containing material. Provide equipment and decontamination pads, etc. necessary for the decontamination of equipment and personnel.
- B. Materials that contain PCBs shall meet the removal and disposal requirements specified herein.

C. Equipment and Tools Decontamination: The decontamination procedure shall follow the requirements of 40 CFR 761.79(c)(2), decontamination via a wiping or double wash/rinse with an approved solvent. Equipment and tools that are not or cannot be decontaminated will be managed as PCB Remediation Waste.

D. Personnel Decontamination: Provide and maintain a decontamination area which is to be located in the contamination reduction zone. Coordinate the location of the decontamination area with the Owner's Representative. Decontamination of personnel and equipment is required after performance of activities in the "Regulated Area". The personnel decontamination area may be in the form of a mobile trailer or field station. Personnel decontamination shall, at a minimum, consist of: decontamination before breaks and each time workers exit the "Regulated Area," and at the completion of each work day, to prevent worker exposure and the spread of contaminants off site.

E. Emergency Decontamination: Should a worker be splashed with contaminants, the worker shall be escorted immediately to the field decontamination station and decontaminated in accordance with the HASP. Site eye wash and shower stations shall be made available and be operable.

-END SECTION-

SECTION 01500

WASTE HANDLING, TRANSPORTATION, AND DISPOSITION

PART 1 - GENERAL

1.1 DEFINITIONS

A. Hazardous Waste: The term "Hazardous Waste" shall have the meaning as established in applicable federal and California regulations.

B. TSCA: Toxic Substances Control Act regulations contained in 40 CFR Part 761: Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Use Prohibitions.

1.2 RELATED DOCUMENTS

A. Disposal requirements for selected waste streams are presented in other Technical Specification Sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 WASTE HANDLING, TRANSPORTATION AND DISPOSITION – GENERAL REQUIREMENTS

A. The Contractor shall be responsible for the following:

1. Whenever possible, minimize the amount of waste generated during the Work.
2. Segregate all wastes in accordance with applicable Laws and Regulations and other Technical Specification Sections, as applicable.
3. Store and transport Hazardous Wastes, friable and non-friable asbestos waste, non-hazardous impacted debris, and other wastes designated for off-site disposal in United States Department of Transportation (USDOT) approved containers. Waste additions to any on-site container shall be properly documented as required by applicable federal and state regulations.
4. Waste containers shall be clearly marked and labeled by the Contractor in accordance with applicable Laws and Regulations.
5. If Hazardous Waste must be stored on-site, the Contractor shall ensure that the waste is removed prior to the storage deadline required by applicable Laws and Regulations.
6. Verify that waste shipments do not exceed DOT weight limits and that transportation haulers are properly certified.

B. The Contractor shall be responsible for loading, rigging, transportation and off-site disposition of all wastes and recyclable materials generated during implementation of the Work, including Hazardous Waste, asbestos-containing waste, and non-hazardous waste.

C. The Contractor shall submit to Terraphase for review and approval names and contact information for proposed waste transporters and disposal/recycling facilities. All waste transporters and disposal/recycling facilities proposed by the Contractor are subject to review/approval by Terraphase. Terraphase reserves the right to reject any or all transporters or disposal facilities at their sole discretion. Upon request, the Contractor shall provide Terraphase with copies of proposed transporter licenses and/or certifications.

D. The Contractor must identify and provide the following information:

1. Each waste stream the Contractor anticipates will be generated (including the shipping name of the waste).
2. The proposed disposal facility for each waste stream.
3. The analytical data requirements that the disposal facility (or waste broker, if used) require to classify and profile the waste and provide disposal approval.

E. The Contractor shall directly contract with the approved waste transporters and waste disposal facilities and shall be responsible for all coordination and scheduling activities associated with providing waste containers, the off-site transport and disposition, and the on-site movement of the waste. Subsection 3.02 below provides details related to manifests and other documentation.

3.2 SHIPPING AND DISPOSAL/RECYCLING DOCUMENTS

A. The Contractor shall be responsible for preparing waste profiles for each waste stream, as required by the approved waste disposal facilities; waste manifests (and Land Disposal Restriction [LDR] Notification Forms, as appropriate) and/or bills of lading for each off-site shipment of waste material; and other waste transportation and disposal-related documents, as required by applicable Laws and Regulations and as requested by Terraphase.

B. At least 5 business days prior to finalizing and submitting the waste profiles to the approved disposal facilities, the Contractor shall provide draft profiles to Terraphase for review and comment. The Contractor shall address/incorporate Terraphase's comments and changes (if any) prior to finalizing and sending the profiles to the approved disposal facilities.

C. The Owner will sign all bills of lading, non-hazardous waste manifests, hazardous waste manifests and all other waste shipment documents for all waste shipments. No shipment of waste or recyclable materials shall leave the site without inspection and review by Terraphase.

3.3 WASTE TRANSPORTATION

A. At least 7 calendar days before initiating the waste transportation activities, the Contractor shall prepare a sketch (or a map) and written description of proposed transportation routes to each disposal facility to be used and submit the proposed routes to Terraphase for review and approval.

In developing the transportation routes the Contractor shall consider using main roadways/highways and avoid residential areas, if possible.

B. The scheduling of waste transportation vehicles (and other vehicles) entering and exiting the site shall be coordinated by the Contractor such that to minimize, as reasonably practical, the number of trucks (and other vehicles) parked on the off-site streets.

C. Waste transporting shall be scheduled to non-rush hours, as reasonably practical.

3.4 WASTE DISPOSAL

A. All hazardous waste, TSCA-regulated waste, and non-hazardous waste shall be disposed of at facilities permitted to accept these types of waste.

B. The Contractor shall follow up with the disposal facilities and shall provide Terraphase with copies of fully executed waste manifests, bills of lading, scale tickets, certificates of disposal within time frames specified by applicable Laws and Regulations, but no later than within 20 calendar days of the acceptance of waste/recyclable materials by a disposal facility. At a minimum, the waste manifests and bills of lading shall show quantity of waste materials accepted by a final disposal facility and a certification that the waste has been disposed of in accordance with applicable Laws and Regulations.

-END SECTION-

Appendix A

Hazardous Building Material Survey Report College of Alameda - Building B



**HAZARDOUS BUILDING MATERIAL SURVEY REPORT
COLLEGE OF ALAMEDA - BUILDING B
ALAMEDA, CALIFORNIA**

Prepared for

Peralta Community College District
College of Alameda – Building B Demolition Project
333 East Eight Street, Oakland, CA 94606

Prepared by

Terraphase Engineering Inc.
1404 Franklin Street, Suite 600
Oakland, California 94612

November 6, 2020

Project Number: 0034.016.001



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CONTENTS

ACRONYMS AND ABBREVIATIONS	III
CERTIFICATION	V
RECORD OF REVISIONS	VII
EXECUTIVE SUMMARY	IX
1.0 INTRODUCTION	1
1.1 Site Description	1
1.2 Methodology.....	1
1.2.1 Background	1
1.2.2 Assessment	1
1.2.3 Sample Collection.....	2
1.3 Analytical Methods	2
1.3.1 Asbestos	2
1.3.2 Lead.....	2
1.3.3 PCBs.....	3
2.0 REGULATORY OVERVIEW	4
2.1 Asbestos-Containing Materials	4
2.2 Lead-Based Paints	4
2.3 PCB Regulated Materials.....	5
2.4 Visual Mold Assessment	5
3.0 RESULTS	6
3.1 Results of the Asbestos Building Material Survey.....	6
3.2 Results of the Lead-Based Paint Survey.....	7
3.3 Results of the PCBs Survey.....	8
3.4 Visual Mold Assessment	8
4.0 CONCLUSIONS AND RECOMMENDATIONS	9
4.1 Conclusions	9
4.1.1 Results of the Asbestos Survey	9
4.1.2 Results of the Lead-Based Paint Survey.....	9
4.1.3 Results of the PCB Evaluation	10
4.1.4 Visual Mold Assessment	Error! Bookmark not defined.
5.0 RECOMMENDATIONS	11
6.0 LIMITATIONS	12

TABLES

1	Summary of Bulk Asbestos Sampling Results
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- 2 Summary of Bulk Lead Sampling Results
- 3 Summary of Bulk PCB Sampling Results

FIGURE

- 1 Vicinity Maps
- 2 Sample Location Map – First Floor
- 3 Sample Location Map – Second Floor

APPENDICES

- A Laboratory Report and Chain-of-Custody Documentation
- B Photographic Log
- C Inspector Certifications
- D CDPH Form 8552

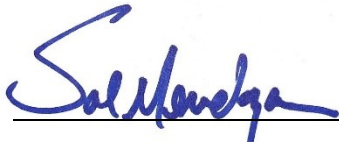
ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing material
ACCM	asbestos-containing construction material
AQMD	Air Quality Management District
CAC	Certified Asbestos Consultant
Cal/OSHA	California Occupational Safety and Health Administration
CDPH	California Department of Public Health
CMU	Concrete masonry unit
DTSC	Department of Toxic Substances Control
Eurofins	Eurofins EMLab P&K Laboratory
HBMS	Hazardous Building Material Survey
HUD	Housing and Urban Development
HVAC	heating, ventilation, and air conditioning
LBP	lead-based paint
LCP	lead-containing paint
mg/cm ²	milligrams per square centimeter
mg/L	milligrams per liter
NESHAP	National Emissions Standard for Hazardous Air Pollutants
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PE	Professional Engineer
PG	Professional Geologist
PLM	polarized light microscopy
PLM/DS	PLM with Dispersion Staining
the Site	Building B, College of Alameda
Terraphase	Terraphase Engineering Inc.

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CERTIFICATION

The information, conclusions, and recommendations in this document have been reviewed by a California Certified Asbestos Consultant and/or Lead-Related Contractor Inspector/Assessor.

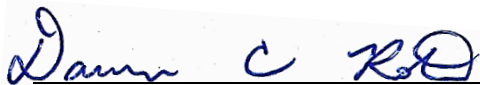


November 6, 2020

Salvador Mendoza, PG, CAC
Certified Asbestos Consultant, No. 03-3386
CDPH Lead Inspector/Assessor, No. 00000496

Date

This report was reviewed and approved by:



November 6, 2020

Daren Roth, CSST
Associate Geologist
Certified Site Surveillance Technician, No. 05-3731

Date

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RECORD OF REVISIONS

Revision Number	Description	Date

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EXECUTIVE SUMMARY

Terraphase Engineering Inc. was retained by the Peralta Community College District to prepare this Hazardous Building Material Survey Report for the Building B Demolition Project (“the Site”), associated with the College of Alameda located at 555 Ralph Appezato Memorial Parkway in Alameda, California (Figures 1 and 2).

The hazardous building materials survey (HBMS) was conducted on October 16, 2020 in support of the building demolition project and included the assessment of potential asbestos-containing materials (ACMs), lead-based paints (LBPs), polychlorinated biphenyls (PCBs), and visual assessment for mold. The results of the survey are summarized below.

Asbestos Survey Results

The following materials were reported by the laboratory as containing asbestos:

- Brown insulation material located beneath the white gravel capped roofing was observed to be in good condition and is classified as an asbestos-containing construction material.
- White joint compound material applied to gypsum boards was observed to be in good condition and is classified as an Category II non-friable ACM.
- White 9-inch vinyl floor tiles and associated mastic located in the second-floor storage rooms were observed to be in good condition and are classified as Category I non-friable ACMs.
- Grey gaskets associated with the boiler system was observed to be in good condition and are classified as Category II non-friable ACMs.
- White hard pack Thermal System Insulation was observed to be in good condition and is classified as a Regulated ACM.
- Black fibrous material located beneath the grey 12-inch vinyl floor tiles in the elevator was observed to be in good condition and is classified as Category I non-friable ACMs.

The remaining samples that were collected as part of Terraphase’s assessment were reported by the laboratory as not containing asbestos.

Lead Survey Results

The following painted building components were identified as containing lead.

- Orange paint applied to the exterior roof mounted HVAC system was observed to be intact and is classified as a lead-containing paint (LCP).
- Orange paint applied to the exterior roof mounted HVAC system I-beams was observed to be intact and is classified as a LBP.

- White paint applied to the walls located in room B207A was observed to be intact and is classified as a LCP.
- Gray paint/coating applied to the ceramic wall tiles in the second-floor restrooms was observed to be intact and is classified as a LCP.
- Brown paint applied to the metal door frames was observed to be intact and is classified as a LBP.
- Blue paint applied to the wood doors was observed to be intact and is classified as a LCP.
- Orange paint applied to the wood door was observed to be intact and is classified as a LBP.
- White paint applied to the CMU walls located in the paint shop was observed to be intact and is classified as a LCP.
- Red paint applied to the stucco wall in the paint shop was observed to be intact and is classified as a LBP.
- Green paint applied to the wood door of the paint shop was observed to be intact and is classified as a LBP.
- White paint applied to the metal handrail associated with the stairway was observed to be intact and is classified as a LCP.

The remaining samples that were collected as part of Terraphase's assessment were identified as not containing lead above the laboratory reporting limit.

Polychlorinated Biphenyls Results

With the exception of the gray mastic applied to a roof vent, analysis of the bulk samples collected as part of this assessment indicated that they do not contain greater than 50 milligrams per kilogram (mg/kg) PCBs. PCBs were not detected above the laboratory's reporting limit associated with a gray mastic. However, the reporting limit exceeded 50 mg/kg. As a result, Terraphase recommends that the gray mastic be resampled or abated as PCBs prior to demolition activities.

Visual Mold Assessment

Terraphase did not observe visible mold growth at the time of our assessment. Additionally, Terraphase is not aware of any reported complaints related to mold at the Site.

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1.0 INTRODUCTION

Terraphase Engineering Inc. was retained by the Peralta Community College District to prepare this Hazardous Building Material Survey Report for the Building B Demolition Project (“the Site”), associated with the College of Alameda located at 555 Ralph Appezato Memorial Parkway in Alameda, California (Figures 1 and 2).

The hazardous building materials survey (HBMS) was conducted on October 16, 2020 in support of the upcoming building demolition project and included the assessment of potential asbestos-containing materials (ACMs), lead-based paints (LBPs), polychlorinated biphenyls (PCBs), and visual assessment for mold. The visual inspection, bulk sampling, and survey documentation was conducted by Mr. Salvador Mendoza and Mr. Mike Schoedinger. Mr. Mendoza and Mr. Schoedinger are California Occupational Safety and Health Administration (Cal/OSHA) Certified Asbestos Consultant (CAC) and a California Department of Public Health (CDPH) Lead Inspector/Assessors, as required by law.

1.1 Site Description

Building B consists of a two-story structure located on the northeastern corner of Campus Loop Road and College Way in Alameda, California. The structure encompasses approximately 45,000 square feet and appears to have been completed circa 1950s. The structure was observed to be in good condition and was constructed with concrete tilt up perimeter walls situated on a concrete slab foundation. Interior finishes included a textured gypsum wall system, concrete walls, and suspended ceiling panels throughout. Flooring materials consisted of vinyl floor tiles, sheet flooring, ceramic floor tiles, and exposed concrete. Exterior finishes included painted concrete walls. The roofing system consists of a gravel capped tar and composition shingles.

1.2 Methodology

1.2.1 Background

Visible, accessible, suspect ACMs, LBPs, and PCBs were identified during a walk-through of the building. The survey included only those areas to which Terraphase’s representatives were provided access and where Terraphase’s representatives deemed it safe to enter. Suspect ACMs and PCBs were divided into “homogeneous applications,” and building materials were established by Terraphase’s representatives to be homogeneous based on their color, texture, and age. The bulk paint chip samples were collected from predominate paint types and assessed for lead content. Terraphase’s representatives collected bulk samples at the Site and submitted these samples to an accredited laboratory for asbestos, lead, and PCB analysis.

1.2.2 Assessment

Assessment of a material’s condition included, among other factors, area occupancy and use, existing damage, and potential for damage. Evaluation of a material’s potential for damage included an evaluation of the position of the material in relation to movable objects and the material’s friability.

1.2.3 Sample Collection

Terraphase's representatives collected bulk samples of suspect ACMs, LBPs, and PCBs from several homogeneous applications. ACMs are described in Table 1, suspected LBPs are described in Table 2, and PCBs are described in Table 3. Figure 1 depicts the site location and Figures 2 and 3 depict general building layout and approximate ACM, LBP, and PCB sampling locations. Bulk samples of various suspect ACMs, LBPs, and PCBs were placed in airtight plastic bags and/or glass jars for transport to the laboratory. Each sample collected by Terraphase personnel was assigned its own unique identification number, which was recorded on the sample container and the bulk sample forms. The samples were collected, transported, analyzed, and stored under chain-of-custody protocols.

1.3 Analytical Methods

The samples were submitted to Eurofins EMLab P&K (Eurofins) in Irvine, California, for analysis. Eurofins holds United States Environmental Protection Agency (U.S. EPA) certification through the National Institute for Standards and Technology National Voluntary Laboratory Accreditation Program for polarized light microscopy (PLM) analysis along with the American Industrial Hygiene Association accreditation. Copies of the bulk sample laboratory analysis results and chain-of-custody documentation are provided in Appendix A.

1.3.1 Asbestos

Material identification was performed using PLM with Dispersion Staining (PLM/DS) in accordance with the U.S. EPA's "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" as found in 40 CFR, Part 763, subpart F, Appendix A (EPA/600/R-93/116). Percentage estimates of each material's components are based on the analyst's best judgment following PLM/DS analysis and examination with a stereoscope.

For building materials identified by the laboratory as containing low percentages of asbestos (i.e., 10% or less) an additional analytical method called Point Counting (PC) may be employed. PC supersedes PLM analysis and is often used to confirm that a material contains 1% or less asbestos. A sample in which no asbestos is detected by PLM does not have to be point counted. A list of the asbestos bulk samples collected by Terraphase's California Occupational Safety and Health Administration (Cal/OSHA) Certified Asbestos Consultant and are presented in Table 1.

1.3.2 Lead

The LBP survey consisted of a site investigation to identify painted surfaces suspected of containing lead. Bulk samples were analyzed using Flame Atomic Absorption Spectrometry. The LBP survey and sampling were conducted in accordance with the HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (HUD 2012). The lead testing combinations were determined by Terraphase's California Department of Public Health (CDPH) certified lead-related Inspector/Assessor and are presented in Table 2.

1.3.3 PCBs

The PCB samples were collected by Terraphase's experienced building inspector and analyzed for PCB content using the United States Environmental Protection Agency's (U.S. EPA) Method 8082A. PCB bulk sample results are included in Table 3.

2.0 REGULATORY OVERVIEW

2.1 Asbestos-Containing Materials

Materials containing greater than 1% asbestos are defined as ACMs by the U.S. EPA. However, Cal/OSHA regulates work practices at asbestos levels of 1% or below. The following U.S. EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) definitions are utilized throughout this report.

- **Friable Asbestos Material**, as defined by the U.S. EPA's NESHAP rule, means any material containing more than 1% asbestos as determined using the method specified in 40 CFR part 763 section 1, PLM, subpart F, Appendix A, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10% as determined by a method other than point counting by PLM, verify the asbestos content by point counting using PLM, or assume it to be positive.
- **Category I Non-Friable Asbestos-Containing Material**, as defined by the U.S. EPA NESHAP, means asbestos-containing packings, gaskets, resilient floor covering and mastic, and asphalt roofing products containing more than 1% asbestos as determined using the method specified in 40 CFR part 763, section 1, PLM, subpart F, Appendix A.
- **Category II Non-Friable Asbestos-Containing Material**, as defined by the U.S. EPA NESHAP, means any material, excluding Category I non-friable ACM, containing more than 1% asbestos as determined using the methods specified in 40 CFR part 763, section 1, PLM, subpart F, Appendix A, that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.
- **Asbestos-Containing Construction Material (ACCM)** is a California-specific term and means any manufactured construction material which contains more than 1/10th of 1% asbestos by weight.
- **Regulated Asbestos-Containing Material** means any friable ACM; a Category I non-friable ACM (such as floor tiles and asphalt roofing products) that has become friable or will be subject to sanding, grinding, cutting, or abrading during demolition or demolition activities; or a Category II non-friable ACM (all other non-friable ACMs) that has a high probability of becoming friable during renovation and/or demolition activities.

2.2 Lead-Based Paints

The U.S. EPA, U.S. Department of Housing and Urban Development (HUD), and the CDPH define LBPs as paints containing equal to or greater than 0.5% lead by weight, 5,000 parts per million, or 1.0 milligram per square centimeter (mg/cm²) total lead. The Occupational Safety and Health Administration (OSHA) and Cal/OSHA regulations (Lead Construction Standard) do not provide a definition for LBP, but refer to the U.S. EPA, HUD, and CDPH criteria mentioned above. Cal/OSHA

is primarily concerned with worker protection, and therefore regulates any amount of lead contained within painted building components.

As required by HUD/U.S. EPA, field calibration checks were performed prior, during, and after the lead inspection(s) to ensure the device was functioning optimally within acceptable limits that are predetermined by the manufacturer.

A lead-containing paint (LCP) is defined here as any amount of lead detected in a sample and for worker protection.

2.3 PCB Regulated Materials

In the past, oil containing PCBs has been used in caulking sealants and in electrical equipment, such as transformers and light ballasts, as a dielectric insulating fluid for heat dissipation. Manufacture of PCBs was banned in 1976; however, distribution of electrical equipment with PCBs was still allowed after that time. The U.S. EPA requires that insulating oils containing PCBs at concentrations greater than 50 milligrams per kilogram (mg/kg) be disposed of properly by a California-licensed hazardous waste hauler. It is also common for fluorescent light tubes and electrical thermostats to contain mercury vapor and/or fluid. If PCBs and mercury are known or presumed to be present within light ballasts, associated fluorescent tubes, and thermostats, they should be disposed of properly by a California-licensed hazardous waste hauler.

2.4 Visual Mold Assessment

Currently, there are no regulatory standards for acceptable amounts of mold spores in residential or commercial structures. Regulatory limits have not been established because the relationship between levels of mold present and adverse reactions in people has not been determined by regulatory agencies.

Mold exposure does not always present a health problem indoors. However, some people are sensitive to molds. These people may experience symptoms such as nasal congestion, eye irritation, wheezing, or skin irritation when exposed to molds. Some people may have more severe reactions to molds. Severe reactions may occur among workers exposed to large amounts of molds in occupational settings. Severe reactions may include fever and shortness of breath. Immunocompromised persons and persons with chronic lung diseases are at increased risk for opportunistic infections and may develop fungal infections in their lungs.

3.0 RESULTS

3.1 Results of the Asbestos Building Material Survey

Terraphase's representatives collected a total of 64 bulk building material samples from various homogeneous applications found at the Site. The following materials were reported by the laboratory as containing asbestos:

- Brown insulation material (sample numbers 1016-03 and 1016-04) located beneath the white gravel capped roofing material was reported by the laboratory as containing less than 1% asbestos by PLM analysis. These samples were further assessed via point counting over 400 empty points and reported by the laboratory as containing less than 0.25% asbestos. The associated white gravel cap and black rolled composition shingles were reported by the laboratory as not containing asbestos. The brown insulation was observed to be in good condition, encompasses approximately 27,000 square feet, and is classified as an ACCM.
- White joint compound material (sample numbers 1016-29 through 1016-33) applied to gypsum boards was reported by the laboratory as between none detect and 2% asbestos via PLM analysis. These samples were further assessed via point counting over 400 empty points and reported by the laboratory as containing between 1.75% and 2.25% asbestos. The gypsum board was reported by the laboratory as not containing asbestos. The white joint compound material was observed to be in good condition, encompasses approximately 10,000 square feet, and is classified as an Category II non-friable ACM.
- White 9-inch vinyl floor tiles and associated mastic (sample numbers 1016-34 and 1016-35) located in the second-floor storage rooms were reported by the laboratory as containing 2% asbestos. The floor tiles and mastic were observed to be in good condition, encompass approximately 500 square feet, and are classified as Category I non-friable ACMs.
- Grey gaskets (sample number 1016-44) associated with the boiler system was reported by the laboratory as containing 45% asbestos. The gasket was observed to be in good condition, encompasses approximately 3 square feet, and are classified as Category II non-friable ACMs.
- White hard pack Thermal System Insulation (TSI; sample numbers 1016-49 and 1016-50) was reported by the laboratory as containing 5% asbestos (note; sample number 1016-50 was not assessed based on EPA's prior positive stop protocol). The white hard pack TSI was observed to be in good condition, encompasses approximately 10 square feet, and is classified as a Regulated ACM (RACM).
- Black fibrous material (sample numbers 1016-60 and 1016-61) located beneath the grey 12-inch vinyl floor tiles located in the elevator were reported by the laboratory as containing 15% asbestos (note; sample number 1016-61 was not assessed based on EPA's prior positive stop protocol). The fibrous material was observed to be in good condition, encompass approximately 18 square feet, and is classified as Category I non-friable ACMs.

The remaining samples that were collected as part of Terraphase's assessment were reported by the laboratory as not containing asbestos. It should be noted that the potential exists for underground utilities constructed with asbestos cement (e.g., Transite™ water pipelines) and/or naturally occurring regulated material to be present beneath the Site. Additional information pertaining to the asbestos assessment is presented in Table 1. A photographic log is included in Appendix B and a copy of the inspector's certification(s) is included in Appendix C.

3.2 Results of the Lead-Based Paint Survey

Terraphase's representatives collected a total of 13 bulk samples for lead analysis. The following painted building components were identified as containing lead.

- Orange paint (sample no. L-01) applied to the exterior roof mounted HVAC system was reported by the laboratory as containing 2,000 parts per million (ppm) lead. The orange paint was observed to be intact and is classified as a LCP.
- Orange paint (sample no. L-02) applied to the exterior roof mounted HVAC system I-beams was reported by the laboratory as containing 100,000 ppm lead. The orange paint was observed to be intact and is classified as a LBP.
- White paint (sample no. L-03) applied to the walls located in room B207A was reported by the laboratory as containing 48 ppm lead. The white paint was observed to be intact and is classified as a LCP.
- Gray paint/coating (sample no. L-05) applied to the ceramic wall tiles in the second-floor restrooms was reported by the laboratory as containing 60 ppm lead. The gray paint was observed to be intact and is classified as a LCP.
- Brown paint (sample no. L-06) applied to the metal door frames was reported by the laboratory as containing 13,000 ppm lead. The brown paint was observed to be intact and is classified as a LBP.
- Blue paint (sample no. L-07) applied to the wood doors was reported by the laboratory as containing 58 ppm lead. The blue paint was observed to be intact and is classified as a LCP.
- Orange paint (sample no. L-08) applied to the wood door was reported by the laboratory as containing 19,000 ppm lead. The orange paint was observed to be intact and is classified as a LBP.
- White paint (sample no. L-09) applied to the concrete masonry unit (CMU) walls located in the paint shop was reported by the laboratory as containing 130 ppm lead. The white paint was observed to be intact and is classified as a LCP.
- Red paint (sample no. 10) applied to the stucco wall in the paint shop was reported by the laboratory as containing 6,700 ppm lead. The red paint was observed to be intact and is classified as a LBP.

- Green paint (sample no. 11) applied to the wood door of the paint shop was reported by the laboratory as containing 13,000 ppm lead. The green paint was observed to be intact and is classified as a LBP.
- White paint (sample no. 12) applied to the metal handrail associated with the stairway was reported by the laboratory as containing 150 ppm lead. The white paint was observed to be intact and is classified as a LCP.

The remaining samples that were collected as part of Terraphase's assessment were identified as not containing lead above the laboratory reporting limit. Additional information pertaining to the lead assessment is presented in Table 2. A copy of the required CPDH form 8552 prepared by Terraphase is included in Appendix D.

3.3 Results of the PCBs Survey

Terraphase's representative collected a total of four bulk samples of caulking and mastic materials for PCB analysis. The following material was identified as containing PCBs.

- Gray seam caulk (sample no. P-01) applied to the base of the concrete walls was reported by the laboratory as containing PCBs at a concentration of 9,900 micrograms per kilogram (which converts to 9.9 mg/kg). The caulking was observed to be intact and contains trace amounts of PCBs.
- Gray seam caulk (sample no. P-02) applied to the CMU restroom wall was reported by the laboratory as containing PCBs at a concentration of 32,000 micrograms per kilogram (which converts to 32 mg/kg). The caulking was observed to be intact and contains trace amounts of PCBs.

While PCBs were not detected above the laboratory reporting limit in the grey mastic (sample P-04), the reporting limit, 97 mg/kg, was almost double the regulatory threshold for PCBs in building materials of 50 mg/kg. Because it cannot be verified that PCBs are not present above 50 mg/kg, it is recommended that this material be resampled or abated prior to the demolition activities. The gray mastic was observed to be intact, encompasses approximately 12 linear feet, and is assumed to contain PCBs until a sufficient number of samples are collected and confirmed not to contain PCBs above 50 mg/kg. The remaining sample was reported by the laboratory as not containing PCBs above the reporting limit. Additional information pertaining to PCB samples is included in Table 3.

3.4 Visual Mold Assessment

Terraphase did not observe visible mold growth at the time of our assessment. Additionally, Terraphase is not aware of any reported complaints related to mold at the Site.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Terraphase understands that Building B will be demolished in the near future. Our conclusions and recommendations are presented below.

4.1 Conclusions

4.1.1 Results of the Asbestos Survey

Analytical results indicated that the following building materials contain asbestos:

- Brown insulation material located beneath the white gravel capped roofing material was observed to be in good condition and is classified as an ACCM.
- The white joint compound material applied to gypsum boards was observed to be in good condition and is classified as an Category II non-friable ACM.
- The white 9-inch vinyl floor tiles and associated mastic located in the second-floor storage rooms were observed to be in good condition and are classified as Category I non-friable ACMs.
- The grey gaskets associated with the boiler system was observed to be in good condition and are classified as Category II non-friable ACMs.
- The white hard pack Thermal System Insulation was observed to be in good condition and is classified as a Regulated ACM (RACM).
- The black fibrous material located beneath the grey 12-inch vinyl floor tiles in the elevator was observed to be in good condition and is classified as Category I non-friable ACMs.

It should be noted that the potential exists for underground utilities constructed with asbestos cement (e.g., Transite™ water pipelines) and/or naturally occurring regulated material to be present beneath the Site. A photographic log is included in Appendix B and a copy of the inspector's certification(s) are included in Appendix C.

4.1.2 Results of the Lead-Based Paint Survey

The following painted building components were identified as containing lead.

- Orange paint applied to the exterior roof mounted HVAC system was observed to be intact and is classified as a LCP.
- Orange paint applied to the exterior roof mounted HVAC system I-beams was observed to be intact and is classified as a LBP.
- White paint applied to the walls located in room B207A was observed to be intact and is classified as a LCP.

- Gray paint/coating applied to the ceramic wall tiles in the second-floor restrooms was observed to be intact and is classified as a LCP.
- Brown paint applied to the metal door frames was observed to be intact and is classified as a LBP.
- Blue paint applied to the wood doors was observed to be intact and is classified as a LCP.
- Orange paint applied to the wood door was observed to be intact and is classified as a LBP.
- White paint applied to the CMU walls located in the paint shop was observed to be intact and is classified as a LCP.
- Red paint applied to the stucco wall in the paint shop was observed to be intact and is classified as a LBP.
- Green paint applied to the wood door of the paint shop was observed to be intact and is classified as a LBP.
- White paint applied to the metal handrail associated with the stairway was observed to be intact and is classified as a LCP.

Additional information pertaining to the lead assessment is presented in Table 2.

4.1.3 Results of the PCB Evaluation

With the exception of the gray mastic applied to a roof vent, analysis of the bulk samples collected as part of this assessment indicated that they do not contain greater than 50 milligrams per kilogram (mg/kg) PCBs. PCBs were not detected above the laboratory's reporting limit associated with the gray mastic. However, the reporting limit exceeded 50 mg/kg. As a result, Terraphase recommends that the gray mastic be resampled or abated as PCBs prior to demolition activities.

4.1.4 Visible Mold Assessment

Terraphase did not observe visible mold growth at the time of our assessment. Additionally, Terraphase is not aware of any reported complaints related to mold at the Site.

5.0 RECOMMENDATIONS

Based upon visual observations and subsequent laboratory analysis of building material samples collected and recorded, ACCMs, ACMs, LCPs, LBPs, and assumed PCBs are present at the Site. Demolition or renovation activities, which could disturb ACCMs, ACMs, LCPs, and LBPs should be performed by properly trained and qualified personnel only, and in accordance with federal, state, and local regulations, as implemented by Cal/OSHA, federal OSHA, U.S. EPA, the Department of Toxic Substances Control (DTSC), and the local Air Quality Management District (AQMD). Prior to any future renovation or demolition work, Terraphase recommends that the following actions be taken:

- ACCMs are not subject to NESHAP requirements. However, a certified asbestos abatement contractor must perform removal work of ACCMs and follow appropriate OSHA work practices.
- The ACCMs, ACMs, LCPs, LBPs, and assumed PCBs observed to be in good condition or intact can be “managed in place” unless the materials are disturbed, repaired, or removed. Prior to demolition or renovation activities, the owner(s) of the building should retain a California-licensed abatement contractor to perform the abatement/remediation of the ACCMs, ACMs, LCPs, LBPs, and assumed PCBs as needed, and prior to disturbance.
- A 10-working-day notification to the local AQMD is required for every demolition or renovation project even when no ACMs are present. Prior to the initiation of the abatement work, the abatement contractor must complete a Notification of Demolition form and submit it to the local AQMD.
- The building owner or his/her representative should obtain a building renovation and/or demolition permit from the local county building department prior to proper removal and disposal of hazardous materials identified at the Site.
- Notification should be provided to contractors, subcontractors, and all other individuals having access to the building as to the presence of ACCMs, ACMs, LCPs, LBPs, and assumed PCBs at the Site.
- If suspect ACCMs, ACMs, LCP, LBPs, and assumed PCBs that are not referenced in this report are identified during future activities, or if material that was not accessible is disturbed, Terraphase recommends that the materials be sampled and analyzed by an accredited laboratory to determine if these materials contain asbestos, lead, and/or PCBs.

6.0 LIMITATIONS

The opinions and recommendations presented in this report are based upon the scope of services, information obtained through the performance of the services, and the schedule as agreed upon by Terraphase and the party for whom this report was originally prepared. This report is an instrument of professional service and was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the environmental consulting industry. No representation, warranty, or guarantee, express or implied, is intended or given. To the extent that Terraphase relied upon any information prepared by other parties not under contract to Terraphase, Terraphase makes no representation as to the accuracy or completeness of such information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared for a particular purpose. Only the party for whom this report was originally prepared and/or other specifically named parties have the right to make use of and rely upon this report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk.

The statements, opinions, and conclusions contained in this report are based solely upon the services performed by Terraphase as described in this report and the Scope of Work as established for the report by the client's budgetary and time constraints and the terms and conditions of the agreement with the client. In performing these services and preparing the report, Terraphase relied upon the work and information provided by others, including other consultants, whose information is not guaranteed by Terraphase. This report is intended for the client's sole and exclusive use and not for the benefit of others and may not be used or relied upon by others. The findings of the report are limited to those specifically expressed in the report and no other representations or warranties are given by Terraphase and no additional conclusions should be reached or representations relied on other than those expressly stated in the report and as limited by the previously agreed upon terms and conditions for this project.

Results of any investigations or testing and any findings presented in this report apply solely to conditions existing at the time when Terraphase's investigative work was performed. It must be recognized that any such investigative or testing activities are inherently limited and do not represent a conclusive or complete characterization. Conditions in other parts of the Site may vary from those at the locations where data were collected. Terraphase's ability to interpret investigation results is related to the availability of the data and the extent of the investigation activities; 100% confidence in environmental investigation conclusions cannot reasonably be achieved.

Terraphase, therefore, does not provide any guarantees, certifications, or warranties regarding any conclusions regarding environmental contamination of any such property. Furthermore, nothing contained in this document shall relieve any other party of its responsibility to abide by contract documents and applicable laws, codes, regulations, or standards.

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TABLES

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Sample ID	Material Description	Material Location	Condition	Asbestos Content	Classification	Approximate Quantity (square feet)
1016-01	White 2x4 ceiling panel	Second floor western hallway	Good	ND	NA	NA
1016-02	White 2x4 ceiling panel	Second floor eastern hallway	Good	ND	NA	NA
1016-03	White cap/black rolled comp. shingle/brown insulation	Roof - western half	Good	ND/ND/<1% (<0.25% PC)	ACCM	27,000
1016-04	White cap/black rolled comp. shingle/brown insulation	Roof - eastern half	Good	ND/ND/<1% (<0.25% PC)		
1016-05	White rubber flashing/beige adhesive	Roof - eastern vent	Good	ND/ND/ND	NA	NA
1016-06	White rubber flashing/beige adhesive	Roof - center vent	Good	ND/ND/ND	NA	NA
1016-07	Grey penetration mastic	Roof-eastern vent	Good	ND	NA	NA
1016-08	Grey penetration mastic	Roof-eastern vent	Good	ND	NA	NA
1016-09	White rubber flashing/black tar/beige non-fibrous material/black tar	Roof - western parapet	Good	ND/ND/ND/ND	NA	NA
1016-10	White rubber flashing/black tar/beige non-fibrous material/black tar	Roof - northern parapet	Good	ND/ND/ND/ND	NA	NA
1016-11	White vibration damper	Roof HVAC	Good	ND	NA	NA
1016-12	White vibration damper	Roof HVAC	Good	ND	NA	NA
1016-13	White vibration damper	Roof HVAC	Good	ND	NA	NA
1016-14	White vibration damper	Roof HVAC	Good	ND	NA	NA
1016-15	White caulking	HVAC	Good	ND	NA	NA
1016-16	White caulking	HVAC	Good	ND	NA	NA
1016-17	White caulking	Northern - parapet cap	Good	ND	NA	NA
1016-18	White caulking	Northern - parapet cap	Good	ND	NA	NA
1016-19	Light gray sheet flooring/yellow mastic	Second floor hallway	Good	ND/ND	NA	NA
1016-20	Light gray sheet flooring/yellow mastic	Room B203	Good	ND/ND	NA	NA
1016-21	Light gray sheet flooring/yellow mastic	Room B201	Good	ND/ND	NA	NA
1016-22	Gray spray applied fire proofing	Second floor - roof access	Good	ND	NA	NA
1016-23	Gray spray applied fire proofing	Second floor - roof access	Good	ND	NA	NA
1016-24	Gray spray applied fire proofing	Room B204	Good	ND	NA	NA
1016-25	Gray spray applied fire proofing	Room 208	Good	ND	NA	NA
1016-26	Gray spray applied fire proofing	Second floor - eastern hallway	Good	ND	NA	NA
1016-27	Brown cove base/brown-yellow mastic	Second floor western hallway	Good	ND/ND	NA	NA
1016-28	Brown cove base/brown-yellow mastic	Room 208	Good	ND/ND	NA	NA
1016-29	White joint compound with paint/cream tape/white joint compound/white drywall with brown paper	Second floor elevator	Good	ND/ND/ND/ND	Category II non-friable ACM	10,000
1016-30	White joint compound with paint/cream tape/white joint compound/white drywall with brown paper	Room B204	Good	2% (1.75% PC)/ND/2% (2.25% PC)/ND		
1016-31	White joint compound with paint/cream tape/white joint compound/white drywall with brown paper	B206	Good	ND/2%/ND/2%		
1016-32	White joint compound with paint/cream tape/white joint compound/white drywall with brown paper	First floor office	Good	ND/ND/ND/ND		
1016-33	White joint compound with paint/cream tape/white joint compound/white drywall with brown paper	Elevator control room	Good	ND/ND/ND/ND	Category I non-friable ACM	500
1016-34	White 9x9 VFT/black mastic	Room 208	Good	2%/2%		
1016-35	White 9x9 VFT/black mastic	Room 207A	Good	PP	NA	NA
1016-36	White TSI 3-inch run wrap/yellow insulation	Room B204	Good	ND/ND	NA	NA
1016-37	White TSI 3-inch run wrap/yellow insulation	Room B204	Good	ND/ND	NA	NA
1016-38	White TSI 4-inch run wrap/yellow insulation	Room B204	Good	ND/ND	NA	NA
1016-39	White TSI 4-inch run wrap/yellow insulation	Room B204	Good	ND/ND	NA	NA
1016-40	White TSI 6-inch run wrap/yellow insulation	Room B204	Good	ND/ND	NA	NA
1016-41	White TSI 6-inch run wrap/yellow insulation	Room B204	Good	ND/ND	NA	NA
1016-42	White boiler TSI wrap/yellow insulation	Room B204	Good	ND/ND	NA	NA
1016-43	White boiler TSI wrap/yellow insulation	Room B204	Good	ND/ND	NA	NA
1016-44	Grey gasket	Room B204	Good	45%	Category II non-friable ACM	3
1016-45	White HVAC Duct tape	Second floor men's restroom	Good	ND	NA	NA
1016-46	White HVAC Duct tape	Room 208	Good	ND	NA	NA
1016-47	White 2x4 ceiling panel	Second floor men's restroom	Good	ND	NA	NA
1016-48	White 2x4 ceiling panel	Second floor women's restroom	Good	ND	NA	NA
1016-49	White hard pack TSI	Room B204	Good	5%	RACM	10
1016-50	White hard pack TSI	Room B204	Good	PP		

Sample ID	Material Description	Material Location	Condition	Asbestos Content	Classification	Approximate Quantity (square feet)
1016-51	White 4-inch cwt/grey grout/grey mortar	Second floor women's restroom	Good	ND/ND/ND	NA	NA
1016-52	White 4-inch cwt/grey grout/grey mortar	First floor women's restroom	Good	ND/ND/ND	NA	NA
1016-53	Grey 2-inch cut/grey grout/grey mortar/gray under layment	Second floor men's restroom	Good	ND/ND/ND/ND	NA	NA
1016-54	Grey 2-inch cut/grey grout/grey mortar/gray under layment	First floor men's restroom	Good	ND/ND/ND/ND	NA	NA
1016-55	Purple CMU/grey mortar	Paint shop by office	Good	ND/ND	NA	NA
1016-56	Purple CMU/grey mortar	Tune up bays	Good	ND/ND	NA	NA
1016-57	Purple CMU/grey mortar	Tune up bays	Good	ND/ND	NA	NA
1016-58	Grey concrete	Paint shop by office	Good	ND	NA	NA
1016-59	Grey concrete	Second floor western hallway	Good	ND	NA	NA
1016-60	Grey 12x12 VFT/orange mastic/black fibrous material	Elevator	Good	ND/ND/15%	Category II non-friable ACM	18
1016-61	Grey 12x12 VFT/orange mastic/black fibrous material	Elevator	Good	PP		
1017-62	Tan stucco/grey stucco	Eastern wall	Good	ND/ND/ND	NA	NA
1017-63	Tan stucco/white stucco/grey stucco	Eastern wall	Good	ND/ND/ND	NA	NA
1017-64	Tan stucco/white stucco/grey stucco	Eastern wall	Good	ND/ND/ND	NA	NA

Notes:

ACM = Asbestos-Containing Material
 Asbestos Content Reported as a percent (%)
Bold indicates sample contains asbestos
 ID = Identification
 LF = Linear feet
 NA = Not Applicable

ND = None Detected
 NP - Not present
 PC = Sample further assessed via Point Counting
 Quantity reported in Square Feet
 RACM = regulated asbestos-containing material
 PP = Prior Positive Stop

¹ Electrical wire insulation will not be sampled unless electrical power is disconnected prior to sampling.

Item Number	Paint Color	Component	Substrate	Condition	Location(s) of Materials	Lead Content (ppm)	Classification
L-01	Orange	HVAC Unit	Metal	Intact	Roof	2,000	LCP
L-02	Orange	I-Beam	Metal	Intact	Roof	100,000	LBP
L-03	White	Wall	Drywall	Intact	B207A	48	LCP
L-04	White	Ceramic tile	Wall	Intact	Second floor women's restroom	<40	ND
L-05	Gray	Ceramic tile	Wall	Intact	Second floor men's restroom	60	LCP
L-06	Brown	Door frame	Metal	Intact	B206	13,000	LBP
L-07	Blue	Door	Wood	Intact	207A	58	LCP
L-08	Orange	Door	Wood	Intact	B204	19,000	LBP
L-09	White	Wall	CMU	Intact	Paint shop	130	LCP
L-10	Red	Wall	Stucco	Intact	Paint shop	6,700	LBP
L-11	Green	Door	Wood	Intact	Paint shop	13,000	LBP
L-12	White	Handrail	Metal	Intact	Stairway	150	LCP
L-13	Blue	Rollup door	Metal	Intact	Paint shop	<53	ND

Notes:

Lead Content Reported as a parts per million

Bold indicates sample contains lead

ID = Identification

LCP = Lead-containing paint

LBP = Lead-Based Paint

LF = Linear feet

NA = Not Applicable

ND = None Detected

Quantity reported in Square

ppm = parts per million

Item Number	Paint Color	Component	Substrate	Condition	Location(s) of Materials	PCB Content	Classification
P-01	Gray seam caulk	Base of the walls	Concrete	Good	Building exterior	9.9 mg/kg	NA
P-02	Gray seam caulk	Wall	CMU	Good	Restroom	32 mg/kg	NA
P-03	White seam caulk	HVAC unit	Metal	Good	Roof	<0.97 mg/kg	NA
P-04	Grey mastic	vent	Metal	Good	Roof	<97 mg/kg	NA

Abbreviations
 NA = not applicable
 PCB = polychlorinated biphenyls
 mg/kg = milligrams per kilogram

FIGURES

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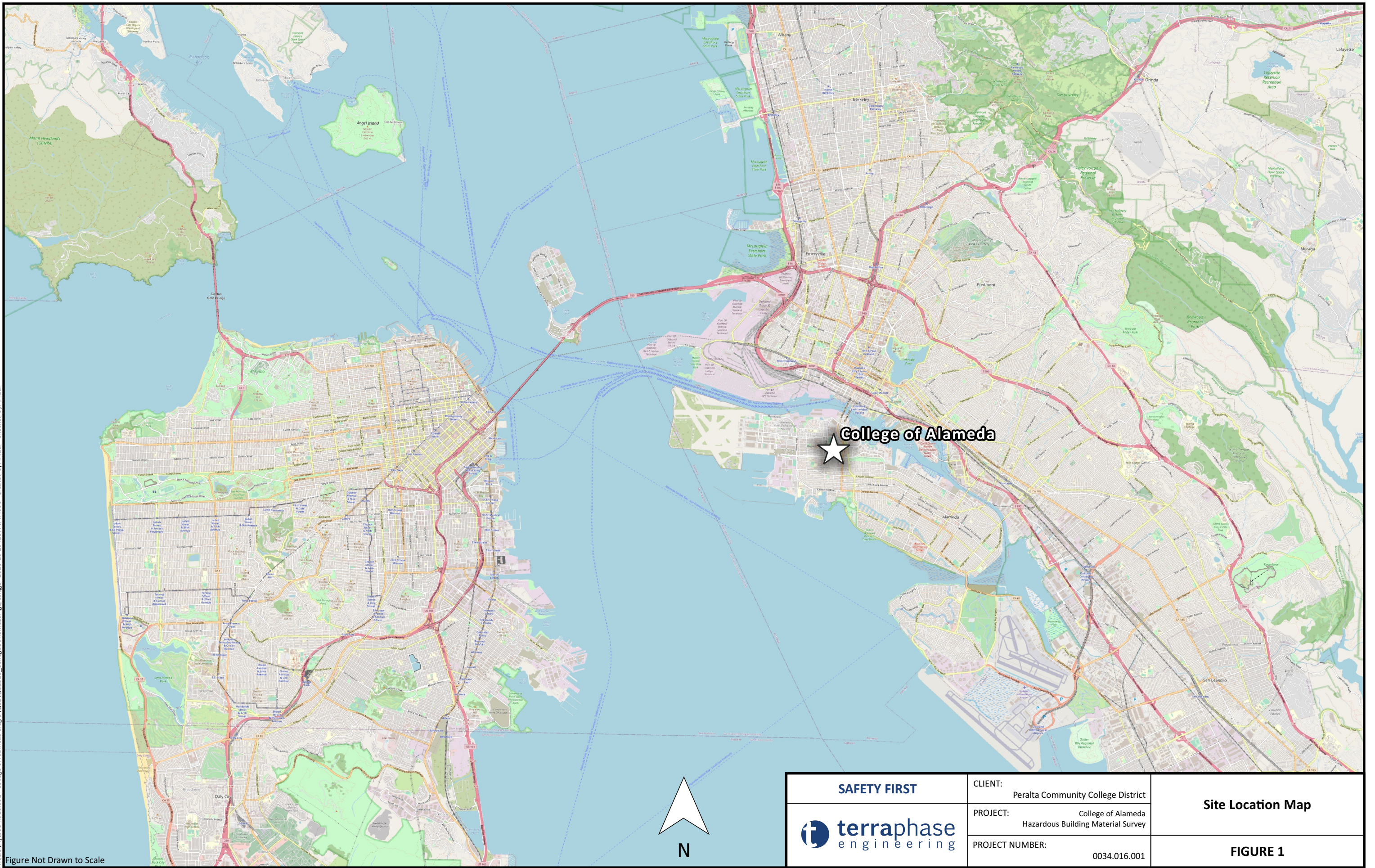


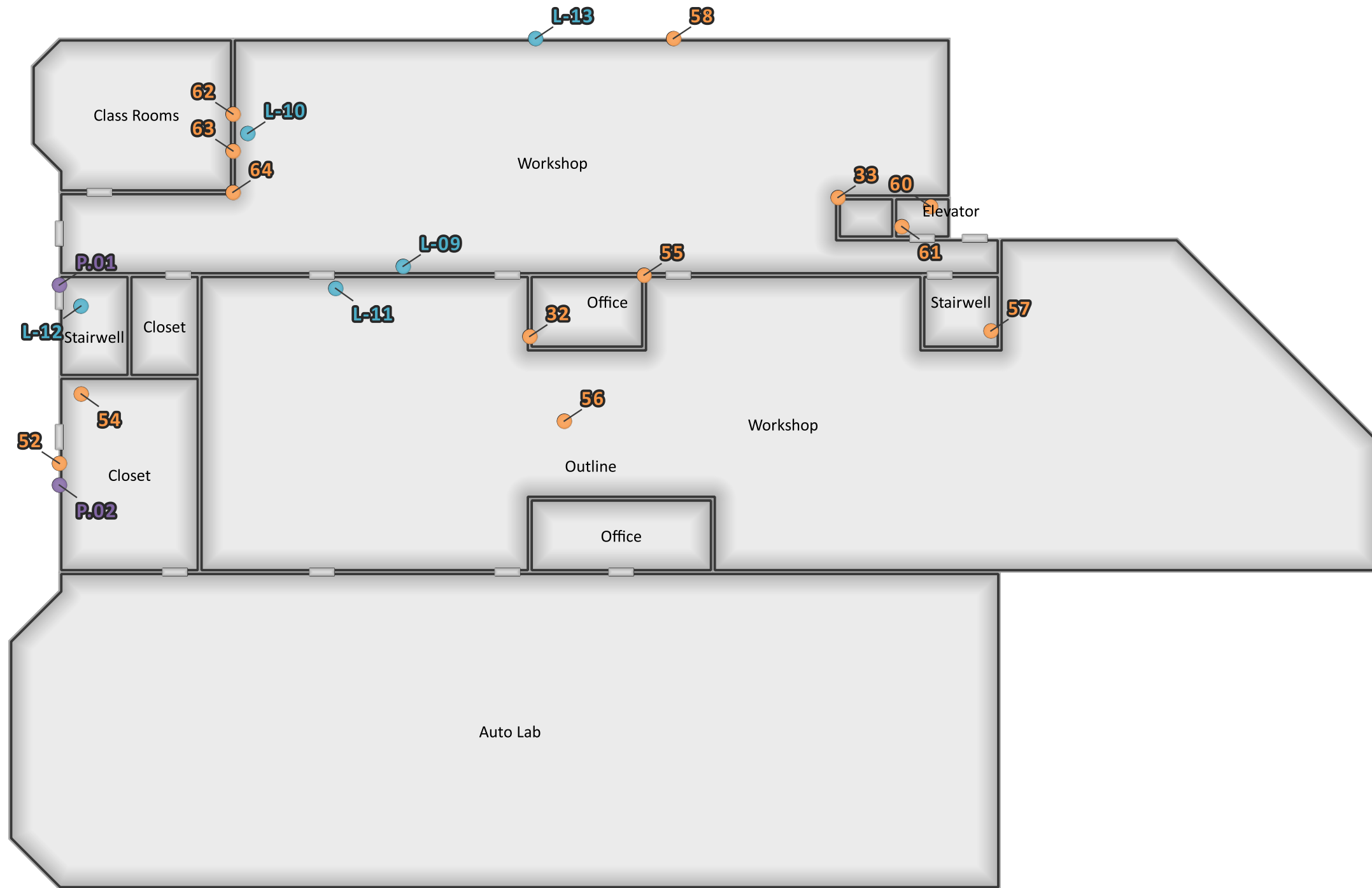


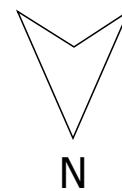
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	CLIENT:	Peralta Community College District	Site Location Map
	PROJECT:	College of Alameda Hazardous Building Material Survey	
	PROJECT NUMBER:	0034.016.001	FIGURE 1

N:\GIS\Proj\0034.016.001 - College of Alameda Bldg B\OG2\OG2316_CollegeOfAlamedaFigures.ogz 2020-10-29T15:44:47.000 Created by: initial Checked by: initial



Legend	
●	Lead bulk sample number(s) and approximate sample locations
●	Asbestos bulk sample number(s) and approximate sample locations
●	PCBs bulk sample number(s) and approximate sample locations

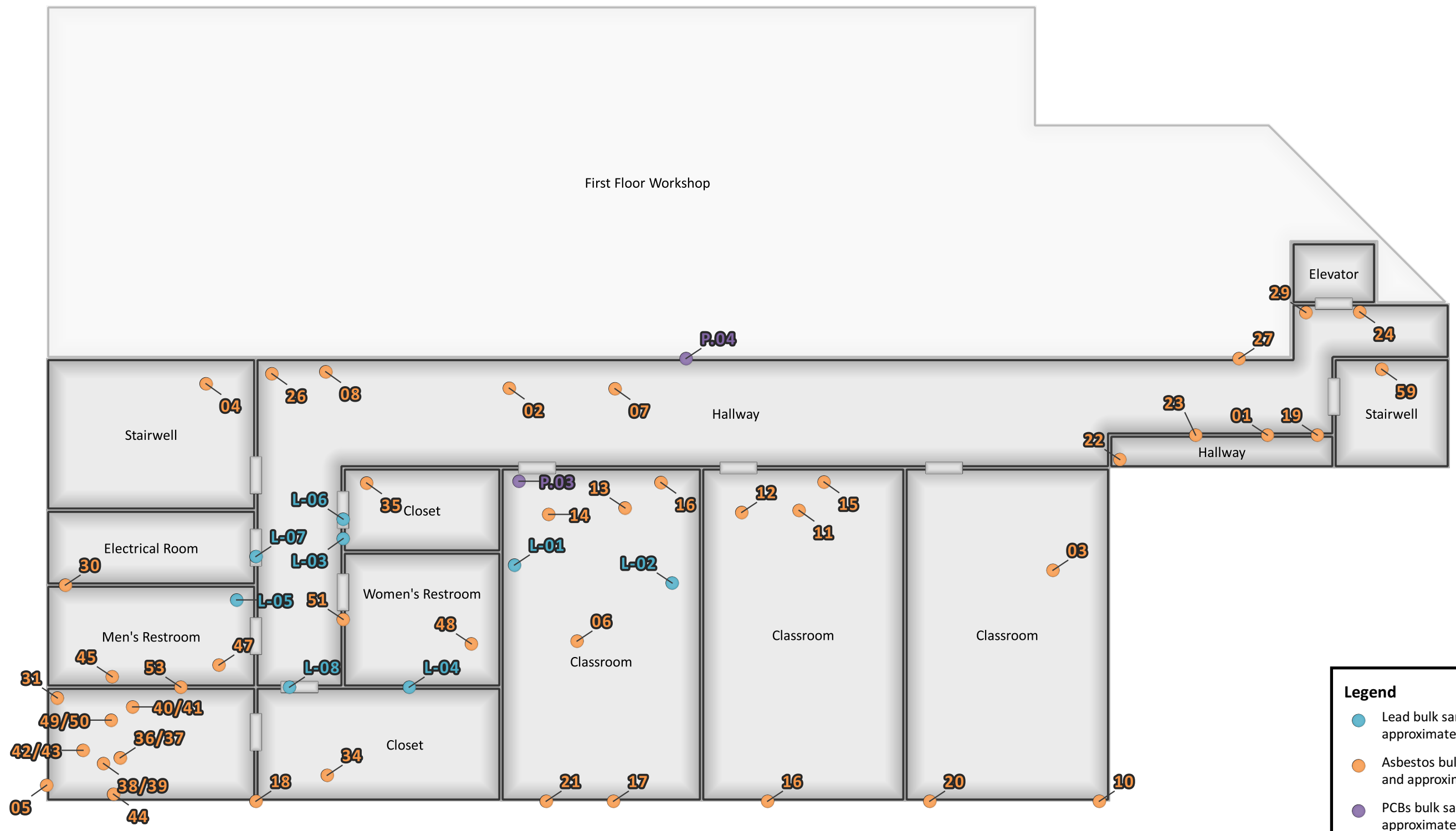


SAFETY FIRST 	CLIENT: Peralta Community College District
	PROJECT: College of Alameda Hazardous Building Material Survey, Building B
	PROJECT NUMBER: 0034.016.001

Sample Location Map Building B, First Floor
FIGURE 2

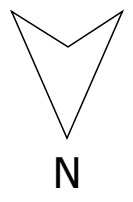
Figure Not Drawn to Scale

N:\GIS\Proj\0034.016.001 - College of Alameda Bldg B\OG2\OG2316_CollegeOfAlameda\Figures\figz_2020-10-29T15:44:47.000 Created by: initial Checked by: initial



Legend

- Lead bulk sample number(s) and approximate sample locations
- Asbestos bulk sample number(s) and approximate sample locations
- PCBs bulk sample number(s) and approximate sample locations



	CLIENT: Peralta Community College District	<p align="center">Sample Location Map Building B, Second Floor</p>
	PROJECT: College of Alameda Hazardous Building Material Survey, Building B	
PROJECT NUMBER: 0034.016.001	FIGURE 3	

Figure Not Drawn to Scale

APPENDIX A
LABORATORY REPORT AND CHAIN-OF-CUSTODY DOCUMENTATION

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Report for:

Salvador Mendoza
Terraphase Engineering Inc
1404 Franklin Street
Suite 600
Oakland, CA 94612

Regarding: Project: 034.016.001; Building B
EML ID: 2506072

Approved by:



Approved Signatory
Danny Li

REVISED REPORT

Dates of Analysis:
Asbestos PLM: 10-23-2020 and 11-04-2020

Service SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)
NVLAP Lab Code 200757-0

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. The results relate only to the samples as received. The results include an inherent uncertainty of measurement associated with estimating percentages by polarized light microscopy. Measurement uncertainty data for sample results with >1% asbestos concentration can be provided when requested.

Eurofins EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building BDate of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020**ASBESTOS PLM REPORT****Total Samples Submitted:** 64**Total Samples Analyzed:** 61**Total Samples with Layer Asbestos Content > 1%:** 6**Location: 1016-01, White 2x4 Ceiling Panel, Second Floor Western Hallway**

Lab ID-Version‡: 11939911-1

Sample Layers	Asbestos Content
Tan Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	45% Cellulose 35% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-02, White 2x4 Ceiling Panel, Second Floor Eastern Hallway

Lab ID-Version‡: 11939912-1

Sample Layers	Asbestos Content
Tan Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	45% Cellulose 35% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-03, White Cap/Black Rolled Comp. Shingle/Brown Insulation, Roof-Western Half

Lab ID-Version‡: 11939913-1

Sample Layers	Asbestos Content
Brown Insulation	< 1% Actinolite
Black Roofing Tar	ND
Black Roofing Shingle	ND
Composite Non-Asbestos Content:	35% Glass Fibers 25% Vermiculite
Sample Composite Homogeneity:	Poor

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Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.

‡ A "Version" indicated by "-x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-04, White Cap/Black Rolled Comp. Shingle/Brown Insulation, Roof-Eastern Half

Lab ID-Version‡: 11939914-1

Sample Layers	Asbestos Content
Brown Insulation	< 1% Actinolite
Black Roofing Tar	ND
Black Roofing Shingle	ND
Composite Non-Asbestos Content:	35% Glass Fibers 25% Vermiculite
Sample Composite Homogeneity:	Poor

Location: 1016-05, White Rubber Flashing/Beige Adhesive, Roof-Eastern Vent

Lab ID-Version‡: 11939915-1

Sample Layers	Asbestos Content
Beige Adhesive	ND
Black Tar	ND
White Non-Fibrous Material	ND
Composite Non-Asbestos Content:	5% Glass Fibers
Sample Composite Homogeneity:	Moderate

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Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-06, White Rubber Flashing/Beige Adhesive, Roof-Center Vent

Lab ID-Version‡: 11939916-1

Sample Layers	Asbestos Content
Beige Adhesive	ND
Black Tar	ND
White Non-Fibrous Material	ND
Composite Non-Asbestos Content:	5% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-07, Grey Penetration Mastic, Roof-Eastern Vent

Lab ID-Version‡: 11939917-1

Sample Layers	Asbestos Content
Gray Roofing Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: 1016-08, Grey Penetration Mastic, Roof-Eastern Vent

Lab ID-Version‡: 11939918-1

Sample Layers	Asbestos Content
Gray Roofing Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: 1016-09, White Rubber Flashing/Black Tar, Roof-Western Parapet

Lab ID-Version‡: 11939919-1

Sample Layers	Asbestos Content
Black Tar	ND
Beige Non-Fibrous Material	ND
Black Tar	ND
White Non-Fibrous Material	ND
Composite Non-Asbestos Content:	5% Glass Fibers
Sample Composite Homogeneity:	Moderate

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Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-10, White Rubber Flashing/Black Tar, Roof-Northern Parapet

Lab ID-Version‡: 11939920-1

Sample Layers	Asbestos Content
Black Tar	ND
Beige Non-Fibrous Material	ND
Black Tar	ND
White Non-Fibrous Material	ND
Composite Non-Asbestos Content:	5% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-11, White Vibration Damper, Roof HVAC

Lab ID-Version‡: 11939921-1

Sample Layers	Asbestos Content
Gray Semi-Fibrous Material	ND
Composite Non-Asbestos Content:	45% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-12, White Vibration Damper, Roof HVAC

Lab ID-Version‡: 11939922-1

Sample Layers	Asbestos Content
Gray Semi-Fibrous Material	ND
Composite Non-Asbestos Content:	45% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-13, White Vibration Damper, Roof HVAC

Lab ID-Version‡: 11939923-1

Sample Layers	Asbestos Content
Gray Semi-Fibrous Material	ND
Composite Non-Asbestos Content:	45% Glass Fibers
Sample Composite Homogeneity:	Moderate

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Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-14, White Vibration Damper, Roof HVAC

Lab ID-Version‡: 11939924-1

Sample Layers	Asbestos Content
Gray Semi-Fibrous Material	ND
Composite Non-Asbestos Content:	45% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-15, White Caulking, HVAC

Lab ID-Version‡: 11939925-1

Sample Layers	Asbestos Content
Gray Caulk	ND
Sample Composite Homogeneity:	Moderate

Location: 1016-16, White Caulking, HVAC

Lab ID-Version‡: 11939926-1

Sample Layers	Asbestos Content
Gray Caulk	ND
Sample Composite Homogeneity:	Moderate

Location: 1016-17, White Caulking, Northern-Parapet Cap

Lab ID-Version‡: 11939927-1

Sample Layers	Asbestos Content
Gray/White Caulk	ND
Sample Composite Homogeneity:	Moderate

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Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-18, White Caulking, Northern-Parapet Cap

Lab ID-Version‡: 11939928-1

Sample Layers	Asbestos Content
Gray/White Caulk	ND
Sample Composite Homogeneity: Moderate	

Location: 1016-19, Light Gray Sheet Flooring, Second Floor Hallway

Lab ID-Version‡: 11939929-1

Sample Layers	Asbestos Content
Yellow Mastic	ND
Light Gray Sheet Flooring	ND
Composite Non-Asbestos Content: 25% Cellulose	
Sample Composite Homogeneity: Good	

Location: 1016-20, Light Gray Sheet Flooring, Room B203

Lab ID-Version‡: 11939930-1

Sample Layers	Asbestos Content
Yellow Mastic	ND
Light Gray Sheet Flooring	ND
Composite Non-Asbestos Content: 25% Cellulose	
Sample Composite Homogeneity: Good	

Location: 1016-21, Light Gray Sheet Flooring, Room B201

Lab ID-Version‡: 11939931-1

Sample Layers	Asbestos Content
Yellow Mastic	ND
Light Gray Sheet Flooring	ND
Composite Non-Asbestos Content: 25% Cellulose	
Sample Composite Homogeneity: Good	

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Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building BDate of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020**ASBESTOS PLM REPORT****Location: 1016-22, Gray Spray Applied Fire Proofing, Second Floor-Roof Access**

Lab ID-Version‡: 11939932-1

Sample Layers	Asbestos Content
Gray Fireproofing	ND
Composite Non-Asbestos Content:	75% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 1016-23, Gray Spray Applied Fire Proofing, Second Floor-Roof Access

Lab ID-Version‡: 11939933-1

Sample Layers	Asbestos Content
Gray Fireproofing	ND
Composite Non-Asbestos Content:	75% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 1016-24, Gray Spray Applied Fire Proofing, Room B204

Lab ID-Version‡: 11939934-1

Sample Layers	Asbestos Content
Gray Fireproofing	ND
Composite Non-Asbestos Content:	75% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 1016-25, Gray Spray Applied Fire Proofing, Room 208

Lab ID-Version‡: 11939935-1

Sample Layers	Asbestos Content
Gray Fireproofing	ND
Composite Non-Asbestos Content:	75% Cellulose
Sample Composite Homogeneity:	Moderate

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Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-26, Gray Spray Applied Fire Proofing, Second Floor-Eastern Hallway Lab ID-Version‡: 11939936-1

Sample Layers	Asbestos Content
Gray Fireproofing	ND
Composite Non-Asbestos Content: 75% Cellulose	
Sample Composite Homogeneity: Moderate	

Location: 1016-27, Brown Cove Base Mastic, Second Floor Western Hallway Lab ID-Version‡: 11939937-1

Sample Layers	Asbestos Content
Black/Yellow Mastic	ND
Brown Baseboard	ND
Sample Composite Homogeneity: Good	

Location: 1016-28, Yellow Cove Base Mastic, Room 208 Lab ID-Version‡: 11939938-1

Sample Layers	Asbestos Content
Brown/Beige Mastic	ND
Sample Composite Homogeneity: Good	

Comments: Baseboard not detected.

Location: 1016-29, White Drywall/White Joint Compound, Second Floor Elevator Lab ID-Version‡: 11939939-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	ND
Cream Tape	ND
White Joint Compound	ND
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content: 10% Cellulose	
Sample Composite Homogeneity: Moderate	

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Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building BDate of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020**ASBESTOS PLM REPORT****Location: 1016-30, White Drywall/White Joint Compound, Room B204**

Lab ID-Version‡: 11939940-2

Sample Layers	Asbestos Content
White Drywall with Brown Paper	ND
White Joint Compound	2% Chrysotile
Cream Tape	ND
White Joint Compound with Paint	2% Chrysotile
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

Location: 1016-31, White Drywall/White Joint Compound, B206

Lab ID-Version‡: 11939941-1

Sample Layers	Asbestos Content
White Drywall	ND
White Joint Compound	2% Chrysotile
Cream Tape	ND
White Joint Compound with Brown Paper	2% Chrysotile
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	15% Cellulose
Sample Composite Homogeneity:	Good

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

Location: 1016-32, White Drywall/White Joint Compound, First Floor Office

Lab ID-Version‡: 11939942-1

Sample Layers	Asbestos Content
White Drywall	ND
White Joint Compound	ND
Cream Tape	ND
White Joint Compound with Brown Paper	ND
Composite Non-Asbestos Content:	15% Cellulose
Sample Composite Homogeneity:	Good

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Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-33, White Drywall/White Joint Compound, Elevator Control Room

Lab ID-Version‡: 11939943-1

Sample Layers	Asbestos Content
White Drywall	ND
White Joint Compound	ND
Cream Tape	ND
White Joint Compound with Brown Paper	ND
Composite Non-Asbestos Content:	15% Cellulose
Sample Composite Homogeneity:	Good

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Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building BDate of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020**ASBESTOS PLM REPORT****Location: 1016-34, White 9x9 VFT/Black Mastic, Room 208**

Lab ID-Version‡: 11939944-1

Sample Layers	Asbestos Content
White Floor Tile	2% Chrysotile
Black Mastic	2% Chrysotile
Sample Composite Homogeneity: Moderate	

Comments: Sample 1016-35 was not analyzed due to prior positive series.

Location: 1016-36, White TSI 3-Inch Run, Room B204

Lab ID-Version‡: 11939946-1

Sample Layers	Asbestos Content
White Non-Fibrous Material	ND
Yellow Insulation	ND
Composite Non-Asbestos Content:	95% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-37, White TSI 3-Inch Run, Room B204

Lab ID-Version‡: 11939947-1

Sample Layers	Asbestos Content
White Non-Fibrous Material	ND
Yellow Insulation	ND
Composite Non-Asbestos Content:	95% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-38, White TSI 4-Inch Run, Room B204

Lab ID-Version‡: 11939948-1

Sample Layers	Asbestos Content
White Non-Fibrous Material	ND
Yellow Insulation	ND
Composite Non-Asbestos Content:	95% Glass Fibers
Sample Composite Homogeneity:	Moderate

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Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building BDate of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020**ASBESTOS PLM REPORT****Location: 1016-39, White TSI 4-Inch Run, Room B204**

Lab ID-Version‡: 11939949-1

Sample Layers	Asbestos Content
White Non-Fibrous Material	ND
Yellow Insulation	ND
Composite Non-Asbestos Content:	95% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-40, White TSI 6-Inch Run, Room B204

Lab ID-Version‡: 11939950-1

Sample Layers	Asbestos Content
White Non-Fibrous Material	ND
Yellow Insulation	ND
Composite Non-Asbestos Content:	95% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-41, White TSI 6-Inch Run, Room B204

Lab ID-Version‡: 11939951-1

Sample Layers	Asbestos Content
White Non-Fibrous Material	ND
Yellow Insulation	ND
Composite Non-Asbestos Content:	95% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-42, White Boiler TSI, Room B204

Lab ID-Version‡: 11939952-1

Sample Layers	Asbestos Content
White Non-Fibrous Material	ND
Yellow Insulation	ND
Composite Non-Asbestos Content:	95% Glass Fibers
Sample Composite Homogeneity:	Moderate

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Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-43, White Boiler TSI, Room B204

Lab ID-Version‡: 11939953-1

Sample Layers	Asbestos Content
White Non-Fibrous Material	ND
Yellow Insulation	ND
Composite Non-Asbestos Content:	95% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-44, Grey Gasket, Room B204

Lab ID-Version‡: 11939954-1

Sample Layers	Asbestos Content
Gray Gasket	45% Chrysotile
Sample Composite Homogeneity:	Good

Location: 1016-45, White HVAC Duct Tape, Second Floor Men's Restroom

Lab ID-Version‡: 11939955-1

Sample Layers	Asbestos Content
White Tape	ND
Composite Non-Asbestos Content:	45% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: 1016-46, White HVAC Duct Tape, Room 208

Lab ID-Version‡: 11939956-1

Sample Layers	Asbestos Content
White Tape	ND
Composite Non-Asbestos Content:	45% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

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Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.

‡ A "Version" indicated by "-x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building BDate of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020**ASBESTOS PLM REPORT****Location: 1016-47, White 2x4 Ceiling Panel, Second Floor Men's Restroom**

Lab ID-Version‡: 11939957-1

Sample Layers	Asbestos Content
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 1016-48, White 2x4 Ceiling Panel, Second Floor Women's Restroom

Lab ID-Version‡: 11939958-1

Sample Layers	Asbestos Content
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 1016-49, White Hard Pack TSI, Room B204

Lab ID-Version‡: 11939959-1

Sample Layers	Asbestos Content
White Insulation	5% Chrysotile
Sample Composite Homogeneity:	Moderate

Comments: Sample 1016-50 was not analyzed due to prior positive series.**Location: 1016-51, White 4-Inch cwt/Grey Grout/Grey Mortar, Second Floor Women's Restroom**

Lab ID-Version‡: 11939961-1

Sample Layers	Asbestos Content
White Ceramic Tile	ND
Gray Grout	ND
White Mortar	ND
Sample Composite Homogeneity:	Moderate

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Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-52, White 4-Inch cwt/Grey Grout/Grey Mortar, First Floor Women's Restroom

Lab ID-Version‡: 11939962-1

Sample Layers	Asbestos Content
White Ceramic Tile	ND
Gray Grout	ND
Gray Mortar	ND
White Texture	ND
Sample Composite Homogeneity:	Moderate

Location: 1016-53, Grey 2-Inch cft/Greu Grout/Grey Mortar/Gray Under Layment, Second Floor Men's Restroom

Lab ID-Version‡: 11939963-1

Sample Layers	Asbestos Content
Gray/Black Felt	ND
Brown Mortar	ND
Gray Grout	ND
Gray Ceramic Tile	ND
Sample Composite Homogeneity:	Moderate

Location: 1016-54, Grey 2-Inch cft/Greu Grout/Grey Mortar/Gray Under Layment, First Floor Men's Restroom

Lab ID-Version‡: 11939964-1

Sample Layers	Asbestos Content
Gray Non-Fibrous Material	ND
Gray Mortar	ND
Dark Gray Grout	ND
Gray Ceramic Tile	ND
Sample Composite Homogeneity:	Moderate

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‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins EMLab P&K

17461 Derian Ave, Suite 100, Irvine, CA 92614
(866) 888-6653 Fax (623) 780-7695 www.emlab.com

Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-55, Purple CMU/Grey Mortar, Paint Shop by Office

Lab ID-Version‡: 11939965-1

Sample Layers	Asbestos Content
Gray Mortar	ND
Purple Cementitious Material	ND
Sample Composite Homogeneity: Moderate	

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‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-56, Purple CMU/Grey Mortar, Tune Up Bays

Lab ID-Version‡: 11939966-1

Sample Layers	Asbestos Content
Gray Mortar	ND
Purple Cementitious Material	ND
Sample Composite Homogeneity: Moderate	

Location: 1016-57, Purple CMU/Grey Mortar, Tune Up Bays

Lab ID-Version‡: 11939967-1

Sample Layers	Asbestos Content
Gray Mortar	ND
Purple Cementitious Material	ND
Sample Composite Homogeneity: Moderate	

Location: 1016-58, Grey Concrete, Paint Shop by Office

Lab ID-Version‡: 11939968-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity: Good	

Location: 1016-59, Grey Concrete, Second Floor Wester Hallway

Lab ID-Version‡: 11939969-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity: Good	

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‡ A "Version" indicated by "-x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 11-04-2020

ASBESTOS PLM REPORT

Location: 1016-60, Grey 12x12 VFT/Orange Mastic, Elevator

Lab ID-Version‡: 11939970-1

Sample Layers	Asbestos Content
Brown Fibrous Material	15% Chrysotile
Orange Mastic	ND
Gray Floor Tile	ND
Sample Composite Homogeneity: Moderate	

Comments: Sample 1016-61 was not analyzed due to prior positive series.

Location: 1016-62, Grey Stucco, Eastern Wall

Lab ID-Version‡: 11939972-1

Sample Layers	Asbestos Content
Gray Stucco	ND
Tan Stucco	ND
Sample Composite Homogeneity: Moderate	

Location: 1016-63, Grey Stucco, Eastern Wall

Lab ID-Version‡: 11939973-1

Sample Layers	Asbestos Content
Gray Stucco	ND
White Stucco	ND
Tan Stucco	ND
Sample Composite Homogeneity: Moderate	

Location: 1016-64, Grey Stucco, Eastern Wall

Lab ID-Version‡: 11939974-1

Sample Layers	Asbestos Content
Gray Stucco	ND
White Stucco	ND
Tan Stucco	ND
Sample Composite Homogeneity: Moderate	

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Eurofins EMLab P&K

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Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020

SUMMARY OF REVISIONS

Location: 1016-30; White Drywall/White Joint Compound, Room B204 Lab ID-Version‡: 11939940-2
Analysis Time revised. Comments revised.

‡ A "Version" indicated by "-x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Report for:

Salvador Mendoza
Terraphase Engineering Inc
1404 Franklin Street
Suite 600
Oakland, CA 94612

Regarding: Project: 034.016.001; Building B
EML ID: 2506072

Approved by:



Approved Signatory
Danny Li

Dates of Analysis:

Asbestos-EPA 400 point count: 11-03-2020

Service SOPs: Asbestos-EPA 400 point count (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1262)
NVLAP Lab Code 200757-0

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the samples as received.

Eurofins EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

Client: Terraphase Engineering Inc
C/O: Salvador Mendoza
Re: 034.016.001; Building BDate of Sampling: 10-16-2020
Date of Receipt: 10-20-2020
Date of Report: 11-04-2020**ASBESTOS POINT COUNT REPORT**

Location:	1016-03 White Cap/Black Rolled Comp. Shingle/Brown Insulation, Roof-Western Half		
Total Points Counted:	400		
Lab ID-Version‡:	11986119-1		
Sample Layers	Asbestos Type	Asbestos Points Counted	Asbestos Concentration (%)
Brown Insulation	Actinolite	0	< 0.25
Layer Totals:		0	NA

Comments: Asbestos was detected, but no points counted.

Location:	1016-04 White Cap/Black Rolled Comp. Shingle/Brown Insulation, Roof-Eastern Half		
Total Points Counted:	400		
Lab ID-Version‡:	11986120-1		
Sample Layers	Asbestos Type	Asbestos Points Counted	Asbestos Concentration (%)
Brown Insulation	Actinolite	0	< 0.25
Layer Totals:		0	NA

Comments: Asbestos was detected, but no points counted.

Location:	1016-30 White Drywall/White Joint Compound, Room B204		
Total Points Counted:	400		
Lab ID-Version‡:	11986121-1		
Sample Layers	Asbestos Type	Asbestos Points Counted	Asbestos Concentration (%)
White Joint Compound	Chrysotile	9	2.25
Layer Totals:		9	2.25
White Joint Compound with Paint	Chrysotile	7	1.75
Layer Totals:		7	1.75

Comments: Samples 31, 32, and 33 were not analyzed due to prior positive series.

The analytical sensitivity is 1 asbestos point. The limit of detection is 1 asbestos point divided by the total number of points counted and multiplied by 100.

The results relate only to the items tested. Interpretation is left to the company and/or persons who conducted the field work. The test report shall not be reproduced except in full, without written approval of the laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by any agency of the federal government.

All samples were received in acceptable condition unless otherwise noted. Eurofins EMLab P&K reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified.

Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".



002506072

Asbestos Bulk Sampling Data Form and Chain of Custody

Project No.: 034.016.001
 Project Name: Building B
 Sample By: S. Mendoza

Date of Sampling: 16-Oct-20 Client: Peralta
 Project Location: College of Alameda
 Activity: Renovation Demolition Other

Results to: <u>sal.mendoza@terrphase.com</u>	Turnaround Time <input type="checkbox"/> Same Day <input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input checked="" type="checkbox"/> 3 Days <input type="checkbox"/> 5 Days <input type="checkbox"/> Other	Due Date and Time:
Notes: <u>*prior positive stop</u>	Analysis: <input checked="" type="checkbox"/> PLM <input type="checkbox"/> Point Count <input type="checkbox"/> 400 <input type="checkbox"/> 1,000 <input type="checkbox"/> CARB-435 <input type="checkbox"/> TEM <input type="checkbox"/> Other:	

HA#	Sample ID	Homogeneous Material Description (incl. color, texture, phase of construction)	Sample Location	Condition (good, fair, poor)	Quant. in SF	Friable Cat. I Cat. II
	1016-01	White 2x4 ceiling panel	Second floor western hallway	Good	NA	NA
	1016-02	White 2x4 ceiling panel	Second floor eastern hallway	Good	NA	NA
	1016-03	White cap/black rolled comp. shingle/brown insulation	Roof - western half	Good	NA	NA
	1016-04	White cap/black rolled comp. shingle/brown insulation	Roof - eastern half	Good	NA	NA
	1016-05	White rubber flashing/beige adhesive	Roof - eastern vent	Good	NA	NA
	1016-06	White rubber flashing/beige adhesive	Roof - center vent	Good	NA	NA
	1016-07	Grey penetration mastic	Roof-eastern vent	Good	NA	NA
	1016-08	Grey penetration mastic	Roof-eastern vent	Good	NA	NA
	1016-09	White rubber flashing/black tar	Roof - western parapet	Good	NA	NA
	1016-10	White rubber flashing/black tar	Roof - northern parapet	Good	NA	NA
	1016-11	White vibration damper	Roof HVAC	Good	NA	NA
	1016-12	White vibration damper	Roof HVAC	Good	NA	NA
	1016-13	White vibration damper	Roof HVAC	Good	NA	NA
	1016-14	White vibration damper	Roof HVAC	Good	NA	NA
	1016-15	White caulking	HVAC	Good	NA	NA
	1016-16	White caulking	HVAC	Good	NA	NA
	1016-17	White caulking	Northern - parapet cap	Good	NA	NA
	1016-18	White caulking	Northern - parapet cap	Good	NA	NA



002506072

1016-19	Light gray sheet flooring	Second floor hallway	Good	NA	NA
1016-20	Light gray sheet flooring	Room B203	Good	NA	NA
1016-21	Light gray sheet flooring	Room B201	Good	NA	NA
1016-22	Gray spray applied fire proofing	Second floor - roof access	Good	NA	NA
1016-23	Gray spray applied fire proofing	Second floor - roof access	Good	NA	NA
1016-24	Gray spray applied fire proofing	Room B204	Good	NA	NA
1016-25	Gray spray applied fire proofing	Room 208	Good	NA	NA
1016-26	Gray spray applied fire proofing	Second floor - eastern hallway	Good	NA	NA
1016-27	Brown cove base mastic	Second floor western hallway	Good	NA	NA
1016-28	Yellow cove base mastic	Room 208	Good	NA	NA
1016-29	White drywall/white joint compound	Second floor elevator	Good	NA	NA
1016-30	White drywall/white joint compound	Room B204	Good	NA	NA
1016-31	White drywall/white joint compound	B206	Good	NA	NA
1016-32	White drywall/white joint compound	First floor office	Good	NA	NA
1016-33	White drywall/white joint compound	Elevator control room	Good	NA	NA
1016-34	White 9x9 VFT/black mastic	Room 208	Good	NA	NA
1016-35	 White 9x9 VFT/black mastic	Room 207A	Good	NA	NA
1016-36	White TSI 3-inch run	Room B204	Good	NA	NA
1016-37	White TSI 3-inch run	Room B204	Good	NA	NA
1016-38	White TSI 4-inch run	Room B204	Good	NA	NA
1016-39	White TSI 4-inch run	Room B204	Good	NA	NA
1016-40	White TSI 6-inch run	Room B204	Good	NA	NA
1016-41	White TSI 6-inch run	Room B204	Good	NA	NA
1016-42	White boiler TSI	Room B204	Good	NA	NA
1016-43	White boiler TSI	Room B204	Good	NA	NA
1016-44	Grey gasket	Room B204	Good	NA	NA



1016-45	White HVAC Duct tape	Second floor men's restroom	Good	NA	NA
1016-46	White HVAC Duct tape	Room 208	Good	NA	NA
1016-47	White 2x4 ceiling panel	Second floor men's restroom	Good	NA	NA
1016-48	White 2x4 ceiling panel	Second floor women's restroom	Good	NA	NA
1016-49	White hard pack TSI	Room B204	Good	NA	NA
1016-50	White hard pack TSI	Room B204	Good	NA	NA
1016-51	White 4-inch cwt/grey grout/grey mortar	Second floor women's restroom	Good	NA	NA
1016-52	White 4-inch cwt/grey grout/grey mortar	First floor women's restroom	Good	NA	NA
1016-53	Grey 2-inch cft/grey grout/grey mortar/gray under layment	Second floor men's restroom	Good	NA	NA
1016-54	Grey 2-inch cft/grey grout/grey mortar/gray under layment	First floor men's restroom	Good	NA	NA
1016-55	Purple CMU/grey mortar	Paint shop by office	Good	NA	NA
1016-56	Purple CMU/grey mortar	Tune up bays	Good	NA	NA
1016-57	Purple CMU/grey mortar	Tune up bays	Good	NA	NA
1016-58	Grey concrete	Paint shop by office	Good	NA	NA
1016-59	Grey concrete	Second floor western hallway	Good	NA	NA
1016-60	Grey 12x12 VFT/orange mastic	Elevator	Good	NA	NA
1016-61	Grey 12x12 VFT/orange mastic	Elevator	Good	NA	NA
1017-62	Grey stucco	Eastern wall	Good	NA	NA
1017-63	Grey stucco	Eastern wall	Good	NA	NA
1017-64	Grey stucco	Eastern wall	Good	NA	NA

DW = Drywall JC = Joint Compound WT = Wall Texture VFT = Vinyl Floor Tile VSF = Vinyl Sheet Flooring BB = Baseboard BBM = Baseboard Mastic CM = Carpet Mastic
 ACT = Acoustic Ceiling Tile ACS = Sprayed-on Acoustical Ceiling Material FP = Fireproofing PI = Pipe Insulation PFI = Pipe fitting Insulation WP = Plaster CP = Ceiling Plaster ES = Exterior Stucco

Relinquished By:	Date & Time: 10/19/2020 10:00	Received By:	Date & Time: 10/19/2020 16:00
			Condition Acceptable: <input type="checkbox"/> Yes <input type="checkbox"/> No
Relinquished By:	Date & Time:	Received By:	Date & Time:
			Condition Acceptable: <input type="checkbox"/> Yes <input type="checkbox"/> No

Report for:


Salvador Mendoza
Terraphase Engineering Inc
1404 Franklin Street
Suite 600
Oakland, CA 94612

Regarding: Project: 034.016.001; Building B
EML ID: 2505914

Approved by:

Dates of Analysis:

Lead - Flame AA: 10-21-2020



Technical Manager
Andrew Ikeda

Service SOPs: Lead - Flame AA (EM-BC-S-8443)
AIHA-LAP, LLC accredited service, Lab ID #178697

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the samples as received. Sample size, as it relates to Wipe samples only, is supplied by the client.

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Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 10-23-2020

LEAD: FLAME ATOMIC ABSORPTION SPECTROMETRY

Location:	L-01: Roof, HVAC Unit	L-02: Roof, I-Beam	L-03: B207A, Wall	L-04: Second Floor Women's Restroom, Ceramic Tile	L-05: Second Floor Men's Restroom, Ceramic Tile
Comments (see below)	A	A	A	A	A
Lab ID-Version‡:	11939864-1	11939865-1	11939866-1	11939867-1	11939868-1
Analysis Date:	10/21/2020	10/21/2020	10/21/2020	10/21/2020	10/21/2020
Sample type	Paint Chip sample	Paint Chip sample	Paint Chip sample	Paint Chip sample	Paint Chip sample
Method*	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified
† Method Reporting Limit	61 ppm	39 ppm	40 ppm	40 ppm	39 ppm
Sample size	0.1631 grams	0.2545 grams	0.2515 grams	0.2518 grams	0.2564 grams
§ Total Lead Result	2000 ppm	100000 ppm	48 ppm	< 40 ppm	60 ppm

Comments: A) The relative percent difference of the matrix duplicate pair was above control limits. The laboratory control sample and matrix blank were both within control limits and validated the batch.

Sample results have not been corrected for blank values.

Bulk samples are not covered under the AIHA-LAP, LLC service accreditation.

Wipe samples must meet ASTM E1792 criteria. Method Reporting Limits may not be valid for non-ASTM E1792 wipe samples.

*Sample preparation and analytical methods are based upon NIOSH 7082 and EPA 7000B.

† The Method Reporting Limit is the minimum concentration of Lead that the laboratory can confidently detect in the sample.

§ Total Lead Result has been rounded to two significant figures to reflect analytical precision.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 10-23-2020

LEAD: FLAME ATOMIC ABSORPTION SPECTROMETRY

Location:	L-06: B206, Door Frame	L-07: 207A, Door	L-08: B204, Door	L-09: Paint Shop, Wall
Comments (see below)	A	A	A	A
Lab ID-Version‡:	11939869-1	11939870-1	11939871-1	11939872-1
Analysis Date:	10/21/2020	10/21/2020	10/21/2020	10/21/2020
Sample type	Paint Chip sample	Paint Chip sample	Paint Chip sample	Paint Chip sample
Method*	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified
‡ Method Reporting Limit	150 ppm	39 ppm	40 ppm	39 ppm
Sample size	0.0689 grams	0.2557 grams	0.2520 grams	0.2590 grams
§ Total Lead Result	13000 ppm	58 ppm	19000 ppm	130 ppm

Comments: A) The relative percent difference of the matrix duplicate pair was above control limits. The laboratory control sample and matrix blank were both within control limits and validated the batch.

Sample results have not been corrected for blank values.

Bulk samples are not covered under the AIHA-LAP, LLC service accreditation.

Wipe samples must meet ASTM E1792 criteria. Method Reporting Limits may not be valid for non-ASTM E1792 wipe samples.

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‡ The Method Reporting Limit is the minimum concentration of Lead that the laboratory can confidently detect in the sample.

§ Total Lead Result has been rounded to two significant figures to reflect analytical precision.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Client: Terraphase Engineering Inc
 C/O: Salvador Mendoza
 Re: 034.016.001; Building B

Date of Sampling: 10-16-2020
 Date of Receipt: 10-20-2020
 Date of Report: 10-23-2020

LEAD: FLAME ATOMIC ABSORPTION SPECTROMETRY

Location:	L-10: Paint Shop, Wall	L-11: Paint Shop, Door	L-12: Stairway, Handrail	L-13: Paint Shop, Rollup Door
Comments (see below)	A	A	A	A
Lab ID-Version‡:	11939873-1	11939874-1	11939875-1	11939876-1
Analysis Date:	10/21/2020	10/21/2020	10/21/2020	10/21/2020
Sample type	Paint Chip sample	Paint Chip sample	Paint Chip sample	Paint Chip sample
Method*	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified
† Method Reporting Limit	39 ppm	39 ppm	81 ppm	53 ppm
Sample size	0.2574 grams	0.2547 grams	0.1231 grams	0.1877 grams
§ Total Lead Result	6700 ppm	13000 ppm	150 ppm	< 53 ppm

Comments: A) The relative percent difference of the matrix duplicate pair was above control limits. The laboratory control sample and matrix blank were both within control limits and validated the batch.

Sample results have not been corrected for blank values.

Bulk samples are not covered under the AIHA-LAP, LLC service accreditation.

Wipe samples must meet ASTM E1792 criteria. Method Reporting Limits may not be valid for non-ASTM E1792 wipe samples.

*Sample preparation and analytical methods are based upon NIOSH 7082 and EPA 7000B.

† The Method Reporting Limit is the minimum concentration of Lead that the laboratory can confidently detect in the sample.

§ Total Lead Result has been rounded to two significant figures to reflect analytical precision.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".



002505914

Project No.: '034.016.001 Date of Sampling: 16-Oct-20 Client: Peralta
 Project Name: Building B Project Location: _____
 Sample By: Sal Mendoza Activity: Background Removal Clearance Personal

Results to: sal.mendoza@terrphase.com Turnaround Time: Same Day 1 Day 2 Days 3 Days 5 Days Other Due Date and Time: _____
 Notes: _____ Analysis: Flame AA (Pb) Other: _____

Sample No.	Sample Location	Component	Color	Substrate	Condition
L-01	Roof	HVAC Unit	Orange	Metal	Intact
L-02	Roof	I-Beam	Orange	Metal	Intact
L-03	B207A	Wall	White	Drywall	Intact
L-04	Second floor women's restroom	Ceramic tile	White	Wall	Intact
L-05	Second floor men's restroom	Ceramic tile	Gray	Wall	Intact
L-06	B206	Door frame	Brown	Metal	Intact
L-07	207A	Door	Blue	Wood	Intact
L-08	B204	Door	Orange	Wood	Intact
L-09	Paint shop	Wall	White	CMU	Intact
L-10	Paint shop	Wall	Red	Stucco	Intact
L-11	Paint shop	Door	Green	Wood	Intact
L-12	Stairway	Handrail	White	Metal	Intact
L-13	Paint shop	Rollup door	Blue	Metal	Intact

Substrate: wood metal concrete plaster drywall brick

Relinquished By: Sal Mendoza Date & Time: 10/16/2020 Received By: _____ Date & Time: 10/20/2020 10:00
 Condition Acceptable: Yes No
 Relinquished By: _____ Date & Time: _____ Received By: _____ Date & Time: _____
 Condition Acceptable: Yes No

ANALYTICAL REPORT

Eurofins Calscience Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

Laboratory Job ID: 440-273542-1
Client Project/Site: 2505874

For:
EMLab P&K
1501 W. Knudsen Drive
Phoenix, Arizona 85027

Attn: Angela Hetherington



Authorized for release by:
10/26/2020 12:27:32 PM

Jennifer Moffatt, Project Manager I
(949)260-3226
Jennifer.Moffatt@Eurofinset.com

LINKS

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The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.



Table of Contents

Cover Page	1
Table of Contents	2
Sample Summary	3
Case Narrative	4
Client Sample Results	5
Method Summary	7
Lab Chronicle	8
QC Sample Results	9
QC Association Summary	11
Definitions/Glossary	12
Certification Summary	13
Chain of Custody	14
Receipt Checklists	16

Sample Summary

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
440-273542-1	P-01	Solid	10/16/20 00:01	10/20/20 17:00	
440-273542-2	P-02	Solid	10/16/20 00:01	10/20/20 17:00	
440-273542-3	P-03	Solid	10/16/20 00:01	10/20/20 17:00	
440-273542-4	P-04	Solid	10/16/20 00:01	10/20/20 17:00	

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Case Narrative

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Job ID: 440-273542-1

Laboratory: Eurofins Calscience Irvine

Narrative

Job Narrative 440-273542-1

Comments

No additional comments.

Receipt

The samples were received on 10/20/2020 5:00 PM; the samples arrived in good condition. The temperature of the cooler at receipt was 21.9° C.

Receipt Exceptions

The following samples were received at the laboratory outside the required temperature criteria: P-01 (440-273542-1), P-02 (440-273542-2), P-03 (440-273542-3) and P-04 (440-273542-4). There was no cooling media present in the cooler.

The following samples were received at the laboratory without a sample collection time documented on the chain of custody or on the containers: P-01 (440-273542-1), P-02 (440-273542-2), P-03 (440-273542-3) and P-04 (440-273542-4). A time of collection at 00:01am was applied to all samples by default.

GC Semi VOA

Method 8082: The following sample was diluted to bring the concentration of target analytes within the calibration range: P-02 (440-273542-2). Elevated reporting limits (RLs) are provided.

Method 8082: The following sample was diluted due to the nature of the sample matrix: P-04 (440-273542-4). Elevated reporting limits (RLs) are provided.

Method 8082: The following sample required a dilution due to the nature of the sample matrix: P-04 (440-273542-4). Because of this dilution, the surrogate spike concentration in the sample was reduced to a level where the recovery calculation does not provide useful information.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep

Method 3540C: Due to the special matrix (rubber or paint chips), the initial mass used for the following samples deviated from the standard procedure: P-01 (440-273542-1), P-02 (440-273542-2), P-03 (440-273542-3), P-04 (440-273542-4), (440-273542-A-1 MS) and (440-273542-A-1 MSD). The reporting limits (RLs) have been adjusted proportionately. Adjusted the initial mass from 20g to 1g.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample Results

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Client Sample ID: P-01

Lab Sample ID: 440-273542-1

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor 1016	ND	F1	940	ug/Kg		10/22/20 11:03	10/23/20 15:45	1
Aroclor 1221	ND		940	ug/Kg		10/22/20 11:03	10/23/20 15:45	1
Aroclor 1232	ND		940	ug/Kg		10/22/20 11:03	10/23/20 15:45	1
Aroclor 1242	ND		940	ug/Kg		10/22/20 11:03	10/23/20 15:45	1
Aroclor 1248	ND		940	ug/Kg		10/22/20 11:03	10/23/20 15:45	1
Aroclor 1254	9900		940	ug/Kg		10/22/20 11:03	10/23/20 15:45	1
Aroclor 1260	ND	F1	940	ug/Kg		10/22/20 11:03	10/23/20 15:45	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl (Surr)	88		20 - 155	10/22/20 11:03	10/23/20 15:45	1

Client Sample ID: P-02

Lab Sample ID: 440-273542-2

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor 1016	ND		5000	ug/Kg		10/22/20 11:03	10/26/20 10:24	5
Aroclor 1221	ND		5000	ug/Kg		10/22/20 11:03	10/26/20 10:24	5
Aroclor 1232	ND		5000	ug/Kg		10/22/20 11:03	10/26/20 10:24	5
Aroclor 1242	ND		5000	ug/Kg		10/22/20 11:03	10/26/20 10:24	5
Aroclor 1248	ND		5000	ug/Kg		10/22/20 11:03	10/26/20 10:24	5
Aroclor 1254	32000		5000	ug/Kg		10/22/20 11:03	10/26/20 10:24	5
Aroclor 1260	ND		5000	ug/Kg		10/22/20 11:03	10/26/20 10:24	5

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl (Surr)	150		20 - 155	10/22/20 11:03	10/26/20 10:24	5

Client Sample ID: P-03

Lab Sample ID: 440-273542-3

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor 1016	ND		970	ug/Kg		10/22/20 11:03	10/26/20 10:42	1
Aroclor 1221	ND		970	ug/Kg		10/22/20 11:03	10/26/20 10:42	1
Aroclor 1232	ND		970	ug/Kg		10/22/20 11:03	10/26/20 10:42	1
Aroclor 1242	ND		970	ug/Kg		10/22/20 11:03	10/26/20 10:42	1
Aroclor 1248	ND		970	ug/Kg		10/22/20 11:03	10/26/20 10:42	1
Aroclor 1254	ND		970	ug/Kg		10/22/20 11:03	10/26/20 10:42	1
Aroclor 1260	ND		970	ug/Kg		10/22/20 11:03	10/26/20 10:42	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl (Surr)	112		20 - 155	10/22/20 11:03	10/26/20 10:42	1

Client Sample ID: P-04

Lab Sample ID: 440-273542-4

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor 1016	ND		97000	ug/Kg		10/22/20 11:03	10/26/20 10:59	100

Eurofins Calscience Irvine

Client Sample Results

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Client Sample ID: P-04

Lab Sample ID: 440-273542-4

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor 1221	ND		97000	ug/Kg		10/22/20 11:03	10/26/20 10:59	100
Aroclor 1232	ND		97000	ug/Kg		10/22/20 11:03	10/26/20 10:59	100
Aroclor 1242	ND		97000	ug/Kg		10/22/20 11:03	10/26/20 10:59	100
Aroclor 1248	ND		97000	ug/Kg		10/22/20 11:03	10/26/20 10:59	100
Aroclor 1254	ND		97000	ug/Kg		10/22/20 11:03	10/26/20 10:59	100
Aroclor 1260	ND		97000	ug/Kg		10/22/20 11:03	10/26/20 10:59	100

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl (Surr)	239	X	20 - 155	10/22/20 11:03	10/26/20 10:59	100

Method Summary

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Method	Method Description	Protocol	Laboratory
8082	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	ECL 1
3540C	Soxhlet Extraction	SW846	ECL 1

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

ECL 1 = Eurofins Calscience LLC Lincoln, 7440 Lincoln Way, Garden Grove, CA 92841, TEL (714)895-5494



Lab Chronicle

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Client Sample ID: P-01

Lab Sample ID: 440-273542-1

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3540C			1.06 g	10 mL	103773	10/22/20 11:03	USUL	ECL 1
Total/NA	Analysis	8082		1			103728	10/23/20 15:45	UHHN	ECL 1

Client Sample ID: P-02

Lab Sample ID: 440-273542-2

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3540C			1.00 g	10 mL	103773	10/22/20 11:03	USUL	ECL 1
Total/NA	Analysis	8082		5			104555	10/26/20 10:24	UHHN	ECL 1

Client Sample ID: P-03

Lab Sample ID: 440-273542-3

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3540C			1.03 g	10 mL	103773	10/22/20 11:03	USUL	ECL 1
Total/NA	Analysis	8082		1			104555	10/26/20 10:42	UHHN	ECL 1

Client Sample ID: P-04

Lab Sample ID: 440-273542-4

Date Collected: 10/16/20 00:01

Matrix: Solid

Date Received: 10/20/20 17:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3540C			1.03 g	10 mL	103773	10/22/20 11:03	USUL	ECL 1
Total/NA	Analysis	8082		100			104555	10/26/20 10:59	UHHN	ECL 1

Laboratory References:

ECL 1 = Eurofins Calscience LLC Lincoln, 7440 Lincoln Way, Garden Grove, CA 92841, TEL (714)895-5494

QC Sample Results

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 570-103773/1-A
Matrix: Solid
Analysis Batch: 103728

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 103773

Analyte	MB MB		RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Aroclor 1016	ND		50	ug/Kg		10/22/20 11:03	10/23/20 14:15	1
Aroclor 1221	ND		50	ug/Kg		10/22/20 11:03	10/23/20 14:15	1
Aroclor 1232	ND		50	ug/Kg		10/22/20 11:03	10/23/20 14:15	1
Aroclor 1242	ND		50	ug/Kg		10/22/20 11:03	10/23/20 14:15	1
Aroclor 1248	ND		50	ug/Kg		10/22/20 11:03	10/23/20 14:15	1
Aroclor 1254	ND		50	ug/Kg		10/22/20 11:03	10/23/20 14:15	1
Aroclor 1260	ND		50	ug/Kg		10/22/20 11:03	10/23/20 14:15	1
		MB MB	Limits			Prepared	Analyzed	Dil Fac
Surrogate	%Recovery	Qualifier		Prepared	Analyzed	Dil Fac		
DCB Decachlorobiphenyl (Surr)	94		20 - 155	10/22/20 11:03	10/23/20 14:15	1		

Lab Sample ID: LCS 570-103773/2-A
Matrix: Solid
Analysis Batch: 103728

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 103773

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits	%Rec.
Aroclor 1260	100	109		ug/Kg		109	50 - 150	
		LCS LCS	Limits			Prepared	Analyzed	Dil Fac
Surrogate	%Recovery	Qualifier		Prepared	Analyzed	Dil Fac		
DCB Decachlorobiphenyl (Surr)	87		20 - 155	10/22/20 11:03	10/23/20 14:15	1		

Lab Sample ID: LCSD 570-103773/3-A
Matrix: Solid
Analysis Batch: 103728

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 103773

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	%Rec.	RPD	
									RPD	Limit
Aroclor 1016	100	115		ug/Kg		115	50 - 142	18	30	
Aroclor 1260	100	124		ug/Kg		124	50 - 150	13	30	
		LCSD LCSD	Limits			Prepared	Analyzed	Dil Fac		
Surrogate	%Recovery	Qualifier		Prepared	Analyzed	Dil Fac				
DCB Decachlorobiphenyl (Surr)	102		20 - 155	10/22/20 11:03	10/23/20 14:15	1				

Lab Sample ID: 440-273542-1 MS
Matrix: Solid
Analysis Batch: 103728

Client Sample ID: P-01
Prep Type: Total/NA
Prep Batch: 103773

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits	%Rec.
Aroclor 1260	ND	F1	1940	4790	F1	ug/Kg		247	20 - 180	
		MS MS	Limits			Prepared	Analyzed	Dil Fac		
Surrogate	%Recovery	Qualifier		Prepared	Analyzed	Dil Fac				
DCB Decachlorobiphenyl (Surr)	103		20 - 155	10/22/20 11:03	10/23/20 14:15	1				

QC Sample Results

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Lab Sample ID: 440-273542-1 MSD
Matrix: Solid
Analysis Batch: 103728

Client Sample ID: P-01
Prep Type: Total/NA
Prep Batch: 103773

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits	RPD	
Aroclor 1016	ND	F1	1830	3200		ug/Kg		175	20 - 175	28	40
Aroclor 1260	ND	F1	1830	4340	F1	ug/Kg		237	20 - 180	10	40
		<i>MSD</i>	<i>MSD</i>								
<i>Surrogate</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>								
DCB Decachlorobiphenyl (Surr)	116		20 - 155								

QC Association Summary

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

GC Semi VOA

Analysis Batch: 103728

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-273542-1	P-01	Total/NA	Solid	8082	103773
MB 570-103773/1-A	Method Blank	Total/NA	Solid	8082	103773
LCS 570-103773/2-A	Lab Control Sample	Total/NA	Solid	8082	103773
LCSD 570-103773/3-A	Lab Control Sample Dup	Total/NA	Solid	8082	103773
440-273542-1 MS	P-01	Total/NA	Solid	8082	103773
440-273542-1 MSD	P-01	Total/NA	Solid	8082	103773

Prep Batch: 103773

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-273542-1	P-01	Total/NA	Solid	3540C	
440-273542-2	P-02	Total/NA	Solid	3540C	
440-273542-3	P-03	Total/NA	Solid	3540C	
440-273542-4	P-04	Total/NA	Solid	3540C	
MB 570-103773/1-A	Method Blank	Total/NA	Solid	3540C	
LCS 570-103773/2-A	Lab Control Sample	Total/NA	Solid	3540C	
LCSD 570-103773/3-A	Lab Control Sample Dup	Total/NA	Solid	3540C	
440-273542-1 MS	P-01	Total/NA	Solid	3540C	
440-273542-1 MSD	P-01	Total/NA	Solid	3540C	

Analysis Batch: 104555

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-273542-2	P-02	Total/NA	Solid	8082	103773
440-273542-3	P-03	Total/NA	Solid	8082	103773
440-273542-4	P-04	Total/NA	Solid	8082	103773

Definitions/Glossary

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.
X	Surrogate recovery exceeds control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Accreditation/Certification Summary

Client: EMLab P&K
Project/Site: 2505874

Job ID: 440-273542-1

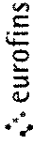
Laboratory: Eurofins Calscience LLC

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	Los Angeles County Sanitation Districts	10109	09-30-21
California	SCAQMD LAP	17LA0919	11-30-20
California	State	2944	09-30-21
Guam	State	20-003R	10-31-20
Nevada	State	CA00111	07-31-21
Oregon	NELAP	CA300001	01-29-21
USDA	US Federal Programs	P330-20-00034	02-10-23
Washington	State	C916-18	10-11-21

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Chain of Custody Record



TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Regulatory Program: DW NPDES RCRA Other

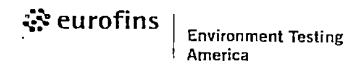
Client Contact EMLab P&K Irvine 17461 Derian Ave Suite 100 Irvine, CA 92614 (xxx) xxx-xxxx Phone (xxx) xxx-xxxx FAX Project Name: 2505674 Site: P O #		Angela Hetherington Email: ahetherington@emiabpk.com Tel/Fax:		Site Contact: Jennifer Moffatt Date:		COC No: 1 of 1 COCs TALS Project #:	
Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input checked="" type="checkbox"/> WORKING DAYS TAT if different from Below _____ 5 days <input type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Lab Contact: Perform MS / MSD (Y / N) Filtered Sample (Y / N) PCB Via EPA SW-846 354OC/8082		Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.: 440-273542		Sample Specific Notes: EDD_Estat_ELDf2e_Terraphase (UDS)	
Sample Identification		Sample Sample Date Sample Time Sample Type (C=Comp, G=Grab) Matrix # of Cont.		Date: P-01 P-02 P-03 P-04		Sample Specific Notes: EDD_Estat_ELDf2e_Terraphase (UDS)	
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other		Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown		Date: 10/20/2020 Date: 10/20/2020 Date: 10/20/2020 Date: 10/20/2020		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) 440-273542 Chain of Custody	
Special Instructions/QC Requirements & Comments:		Relinquished by:		Relinquished by:		Relinquished by:	
Relinquished by:		Relinquished by:		Relinquished by:		Relinquished by:	
Relinquished by:		Relinquished by:		Relinquished by:		Relinquished by:	



Eurofins Calscience Irvine

17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone: 949-261-1022 Fax: 949-260-3297

Chain of Custody Record



Client Information (Sub Contract Lab)		Sampler:		Lab PM: Moffatt, Jennifer		Carrier Tracking No(s):		COC No: 440-163342.1	
Client Contact: Shipping/Receiving		Phone:		E-Mail: Jennifer.Moffatt@Eurofinset.com		State of Origin: California		Page: Page 1 of 1	
Company: Eurofins Calscience LLC				Accreditations Required (See note): State Program - California				Job #: 440-273542-1	
Address: 7440 Lincoln Way,		Due Date Requested: 10/27/2020		Analysis Requested				Preservation Codes: A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2O3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - pH 4-5 L - EDA Z - other (specify)	
City: Garden Grove		TAT Requested (days):							
State, Zip: CA, 92841		PO #:		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		Total Number of containers	
Phone: 714-895-5494(Tel) 714-894-7501(Fax)		WO #:		8082/3546 Routine PCB List					
Email:		Project #: 44020410							
Project Name: 2505874		SSOW#:							
Site:									
Sample Identification - Client ID (Lab ID)		Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/soil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Total Number of containers	Special Instructions/Note:
P-01 (440-273542-1)		10/16/20	00:01 Pacific	Solid		X		1	
P-02 (440-273542-2)		10/16/20	00:01 Pacific	Solid		X		1	
P-03 (440-273542-3)		10/16/20	00:01 Pacific	Solid		X		1	
P-04 (440-273542-4)		10/16/20	00:01 Pacific	Solid		X		1	
<p>Note: Since laboratory accreditations are subject to change, Eurofins Calscience places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Calscience laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Calscience attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Calscience.</p>									
Possible Hazard Identification					Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)				
Unconfirmed					<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months				
Deliverable Requested: I, II, III, IV, Other (specify)			Primary Deliverable Rank: 2		Special Instructions/QC Requirements:				
Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:			
Relinquished by:		Date/Time: 10/21/20 10:15		Company: ECL IRL		Received by:		Date/Time: 10/21/20 10:15	
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:	
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:	
Custody Seals Intact: Δ Yes Δ No		Custody Seal No.:			Cooler Temperature(s) °C and Other Remarks: 3.0/2.2 SC6				

Login Sample Receipt Checklist

Client: EMLab P&K

Job Number: 440-273542-1

Login Number: 273542

List Number: 1

Creator: Escalante, Maria I

List Source: Eurofins Irvine

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	N/A	Not Present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Refer to Job Narrative for details.
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	No time on COC or containers.
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	False	No time on COC or sample containers
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: EMLab P&K

Job Number: 440-273542-1

Login Number: 273542

List Number: 2

Creator: Cruise, Noel

List Source: Eurofins Calscience

List Creation: 10/21/20 05:51 PM

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	2.2
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	





002505874

Project No.: 034.016.001 Date of Sampling: 10/16/2020 Client: Peralta
 Project Name: Building B Project Location: College of Alameda
 Sample By: Sal Mendoza Activity: Background Removal Clearance

Results to: sal.mendoza@terrphase.com Turnaround Time: Same Day 1 Day 2 Days 3 Days 5 Days Other Due Date and Time:
 Notes: Analysis Flame AA (Pb) Other: PCB via EPA SW-846 3540C/8082A

Sample No.	Material	Location	Component	Substrate	Condition
P-01	Grey seem caulk	Buidling exterior - at base of walls	Wall	Concrete	Good
P-02	Grey seem caulk	Buidling exterior - at restroom door	Doors	CMU wall	good
P-03	White HVAC seem caulk	Roof	HVAC	Metal	Good
P-04	Grey vent mastic	Roof	Vent	Metal	Good

Substrate: wood metal concrete plaster drywall brick

Relinquished By: <u>[Signature]</u>	Date & Time: <u>10/19</u> <u>2:00pm</u>	Received By: <u>[Signature]</u>	Date & Time: <u>10/20/2020 10:00</u>
Relinquished By:	Date & Time:	Received By:	Date & Time:
			Condition Acceptable: <input type="checkbox"/> Yes <input type="checkbox"/> No
			Condition Acceptable: <input type="checkbox"/> Yes <input type="checkbox"/> No

APPENDIX B
PHOTOGRAPHIC LOG


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Photograph 1:
View looking west - northwest across the Site and at the Building B exterior.



Photograph 2:
View depicting the auto lab.

<p>SAFETY FIRST</p>	<p>CLIENT: Peralta Community College District</p>	<p>PHOTOGRAPIC LOG</p>
	<p>PROJECT: Hazardous Building Material Survey – College of Alameda, Building B Alameda, California</p>	
<p>PROJECT NUMBER 0034.016.001</p>		<p>PAGE 1</p>



Photograph 3:
View depicting the typical second-floor hallway.



Photograph 4:
View depicting the typical boiler room located on the second floor. Asbestos-containing gaskets on the piping system located on the left side of the picture.

SAFETY FIRST



CLIENT: Peralta Community College District

PROJECT: Hazardous Building Material Survey – College of Alameda, Building B Alameda, California

PROJECT NUMBER 0034.016.001

PHOTOGRAPIC LOG

PAGE 2



Photograph 5:
View depicting the storage room on the second floor and show the asbestos-containing white 9-inch vinyl floor tiles and associated mastic.



Photograph 6:
View depicting the asbestos containing TSI hard pack located in the storage room located on the second floor.

SAFETY FIRST

CLIENT: Peralta Community College District



PROJECT: Hazardous Building Material Survey – College of Alameda, Building B Alameda, California

PROJECT NUMBER 0034.016.001

PHOTOGRAPIC LOG

PAGE 3



Photograph 7:
View depicting the typical second-floor classroom interior. Asbestos-containing joint compound applied to the gypsum board.



Photograph 8:
View depicting the first-floor restroom.

SAFETY FIRST



CLIENT: Peralta Community College District

PROJECT: Hazardous Building Material Survey – College of Alameda, Building B
Alameda, California

PROJECT NUMBER 0034.016.001

PHOTOGRAPIC LOG

PAGE 4



Photograph 9:
View depicting the second-floor restroom.



Photograph 10:
View depicting the typical roof and associated HVAC system. Asbestos-containing brown insulation beneath the white gravel cap.

SAFETY FIRST



CLIENT: Peralta Community College District

PROJECT: Hazardous Building Material Survey – College of Alameda, Building B
Alameda, California

PROJECT NUMBER 0034.016.001

PHOTOGRAPIC LOG

PAGE 5

APPENDIX C
INSPECTOR CERTIFICATION(S)

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DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health
Asbestos Certification & Training Unit

1750 Howe Avenue, Suite 460
Sacramento, CA 95825

(916) 574-2993 Office <http://www.dir.ca.gov/dosh/asbestos.html> acru@dir.ca.gov



409255307C

393

394

MS Testing Services
Michael J Schoedinger
312 W. Portales Drive
Mountain House CA 95391

October 22, 2020

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. **To maintain your certification, you must abide by the rules printed on the back of the certification card.**

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to our office until you apply for renewal of your certification.

Certificates must be kept current if you are actively working as a CAC or CSST. The grace period is only for those who are not actively working as an asbestos consultant or site surveillance technician.

Please notify our office via U.S. Postal Service or other carrier of any changes in your mailing or work address within 15 days of the change.

Sincerely,

Jeff Ferrell
Senior Safety Engineer

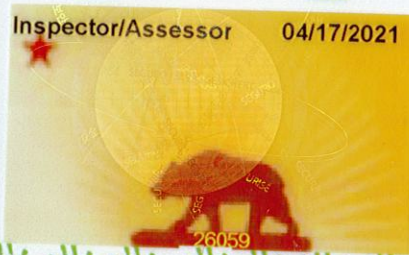
Attachment: Certification Card

cc: File



State of California Department of Public Health
Lead-Related Construction Certificate

<u>Certificate Type</u>	<u>Expiration Date</u>
Inspector/Assessor	04/17/2021



Michael J. Schoedinger ID #: 24858

DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health
Asbestos Certification & Training Unit
2424 Arden Way, Suite 495
Sacramento, CA 95825-2417
(916) 574-2993 Office <http://www.dir.ca.gov/dosh/asbestos.html> acru@dir.ca.gov



306063386C

254

May 05, 2020

Salvador Mendoza
1305 Gold Pan Drive
Roseville CA 95661

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. To maintain your certification, you must abide by the rules printed on the back of the certification card.

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to our office until you apply for renewal of your certification.

Certificates must be kept current if you are actively working as a CAC or CSST. The grace period is only for those who are not actively working as an asbestos consultant or site surveillance technician.

Please notify our office via U.S. Postal Service or other carrier of any changes in your mailing or work address within 15 days of the change.

Sincerely,

Jeff Ferrell
Senior Safety Engineer

Attachment: Certification Card

cc: File

Renewal - Card Attached 08/2019

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Salvador Mendoza
Name

Certification No. **03-3386**

Expires on **06/25/21**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.






STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH



LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:



Salvador Mendoza

CERTIFICATE TYPE:

Lead Inspector/Assessor

NUMBER:

LRC-00000496

EXPIRATION DATE:

7/18/2021

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.

APPENDIX D
CDPH FORM 8552

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LEAD HAZARD EVALUATION REPORT

Section 1 – Date of Lead Hazard Evaluation **October 16, 2020**

Section 2 – Type of Lead Hazard Evaluation (Check one box only)

Lead inspection Risk assessment Clearance inspection Other (specify) _____

Section 3 – Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)] College of Alameda - Building B		City Alameda	County Alameda	Zip Code
Construction date (year) of structure Circa 1930	Type of structure <input type="checkbox"/> Multi-unit building <input type="checkbox"/> School or daycare <input type="checkbox"/> Single family dwelling <input checked="" type="checkbox"/> Other <u>Auto Lab</u>		Children living in structure? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Don't Know	


Section 4 – Owner of Structure (if business/agency, list contact person)

Name Peralta Community College District - Jason Lee		Telephone number 415.235.8028		
Address [number, street, apartment (if applicable)] 333 East Eight Street		City Oakland	State CA	Zip Code 94606

Section 5 – Results of Lead Hazard Evaluation (check all that apply)

No lead-based paint detected Intact lead-based paint detected Deteriorated lead-based paint detected
 No lead hazards detected Lead-contaminated dust found Lead-contaminated soil found Other _____

Section 6 – Individual Conducting Lead Hazard Evaluation

Name Salvador Mendoza		Telephone number 916.661.2484		
Address [number, street, apartment (if applicable)] 1415 L Street, Suite 100		City Sacramento	State CA	Zip Code 95814
CDPH certification number LRC-00000496	Signature 		Date 11/5/2020	

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

Section 7 – Attachments

- A. A foundation diagram or sketch of the structure indicating the specific locations of each lead hazard or presence of lead-based paint;
 B. Each testing method, device, and sampling procedure used;
 C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
 Childhood Lead Poisoning Prevention Branch Reports
 850 Marina Bay Parkway, Building P, Third Floor
 Richmond, CA 94804-6403
 Fax: (510) 620-5656



P.O. Box 1459
 Kinross, WI 53141-1459
 TEL: 262-564-8040
 FAX: 262-566-5602

Regional Manager
 TONY SHASHA
 1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
 FOR
 COLLEGE OF ALAMEDA AUTOMOTIVE
 XX

DATE: _____
 AUTHORIZED SIGNATURE: _____
 SIGNATURE NAME: _____

DATE: 9/8/2021 1:02 PM
 DRAWN: ALR
 REVIEWED: -
 PROJECT NO: 20_80_042563
 DRAWING NO: BAB-1



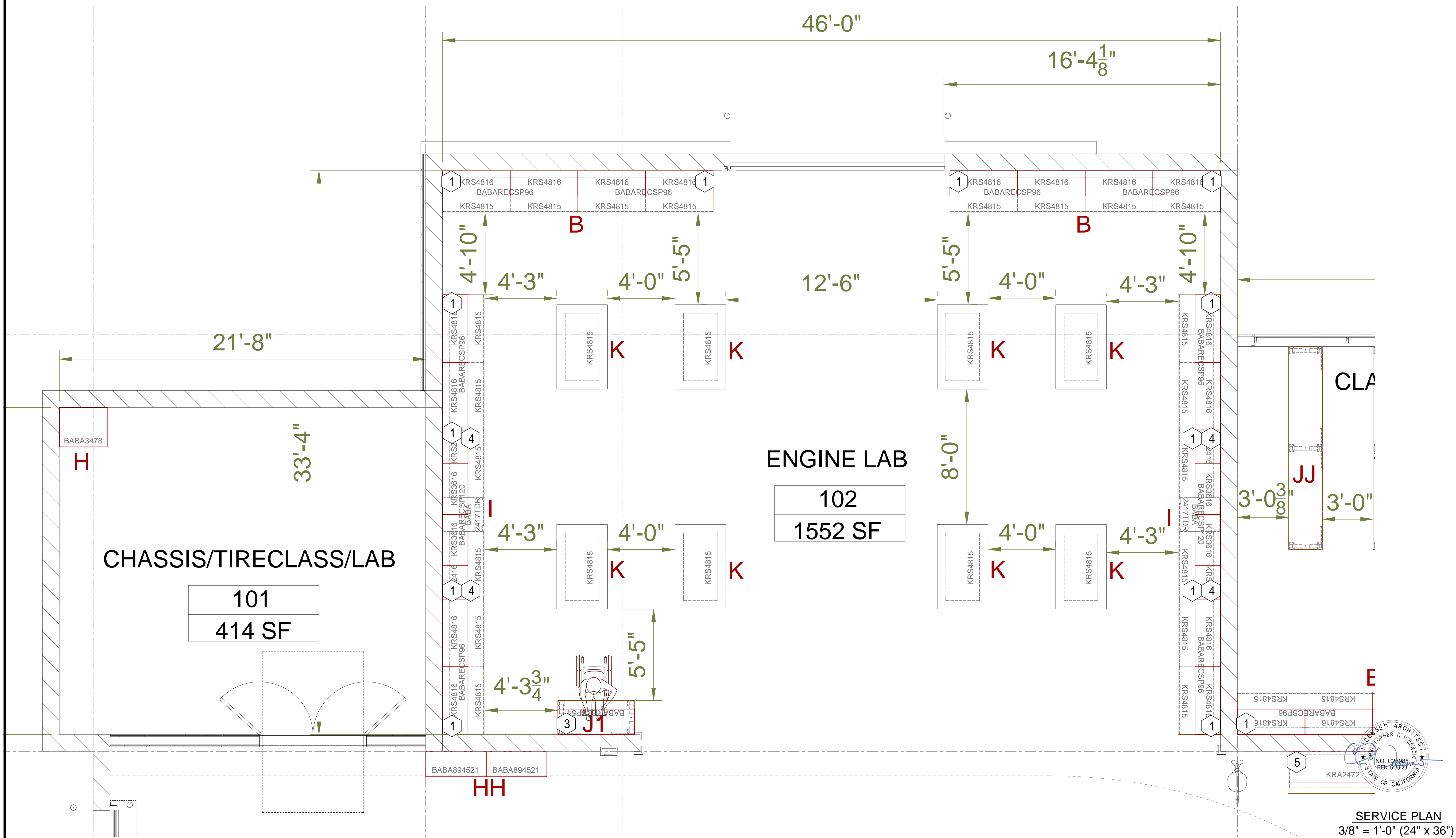
NEW EQUIPMENT ELECTRICAL REQUIREMENTS		
ID #	MODEL/PRODUCT	VOLTAGE
1	QUAD OUTLET	120V Quad Outlet, 20AMP, 30" C.I. AFP
2	DUPLEX OUTLET	120V Duplex Outlet 20AMP, 30" C.I. AFP
3	QUAD OUTLET	120V Quad Outlet, 20AMP, 30" C.I. AFP
4	DATA-QUAD	120V Quad Outlet, 20AMP, Data Cable, 30" C.I. AFP
5	DATA-QUAD	120V Quad Outlet, 20AMP, (3)Data Cabs, 30" C.I. AFP
6	DATA-QUAD	120V Quad Outlet, 20AMP, (3)Data Cabs, 20" C.I. AFP



SERVICE PLAN
 1/16" = 1'-0" (24" x 36")
FOR CONSTRUCTION

Disclaimer
 The drawings provided herein depict approximate measurement for placement of cabinets and equipment. Snap-on makes no representations or warranties relative to compliance with any building code requirements. Qualified architects, engineers, general contractors and construction consultants should be retained by the building owner and/or occupant prior to finalizing any construction plans.
 In no event shall Snap-on, or its parent company(s), be liable for any special, indirect or consequential damages (including, without limitation, lost profits, revenues, anticipated sales, business opportunities or goodwill, interruption of business; or loss of business information) resulting from or arising out of reliance upon these drawings, even if it has been advised of the possibility of such damages.

APPENDIX 02 EQUIPMENT FURNISHINGS



SERVICE PLAN
3/8" = 1'-0" (24" x 36")

FOR CONSTRUCTION

FOR CONSTRUCTION
3/8" = 1'-0" (24" x 36")

Disclaimer
The drawings provided herein depict approximate measurement for placement of cabinets and equipment. Snap-on makes no representations or warranties relative to compliance with any building code requirements. Qualified architects, engineers, general contractors and construction consultants should be retained by the building owner and/or occupant prior to finalizing any construction plans.
In no event shall Snap-on, or its parent company(s), be liable for any special, indirect or consequential damages (including, without limitation, lost profits, revenues, anticipated sales, business opportunities or goodwill, interruption of business; or loss of business information) resulting from or arising out of reliance upon these drawings, even if it has been advised of the possibility of such damages.

Build-A-Bay
Regional Manager
TONY SHASHA
1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

DATE: _____
AUTHORIZED SIGNATURE: _____
SIGNATURES NAME: _____

DATE: 9/8/2021 1:02 PM
DRAWN: ALR
REVIEWED: _____
PROJECT NO: 20_80_042563
DRAWING NO: BAB-2

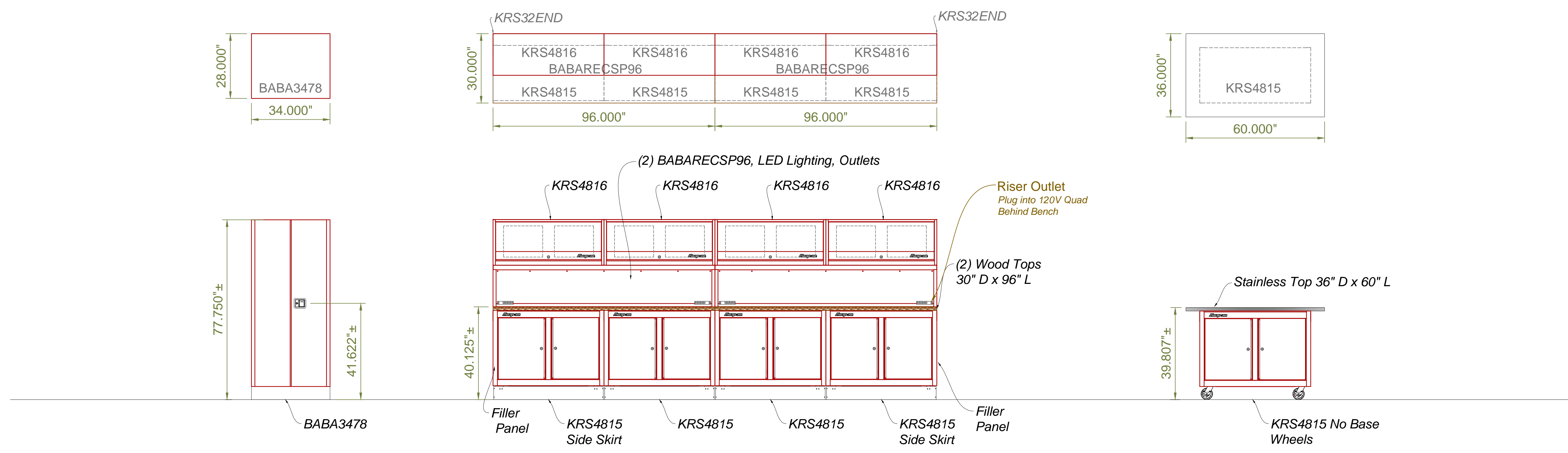
APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Auto Chassis/Tire Class/Lab 101 & Automotive Engine Lab 102 BAB 042563



Regional Manager
TONY SHASHA
1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX



H = 1 Unit
Each Unit Consists:
(1) BABA3478 Tall Cabinet
34" W x 28" D x 77.75" H
(5) Adjustable Shelves
Lockable
Color: RED

B = 2 Units
Each Unit Consists:
(2) Wood Tops, 30" D x 96" L
(4) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
(2) BABARECSP96 Riser, LED Lights, Electric Outlets
(4) KRS4816 Overhead Cabinets
(2) KRS32END Filler Panels
(1) KSSKRT24SET Side Skirt Set
Color: RED

K = 8 Units
Each Unit Consists:
(1) Stainless Top 36" D x 60" L
(1) KRS4815 Bulk Cabinet
Lockable Wheels
Color: RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

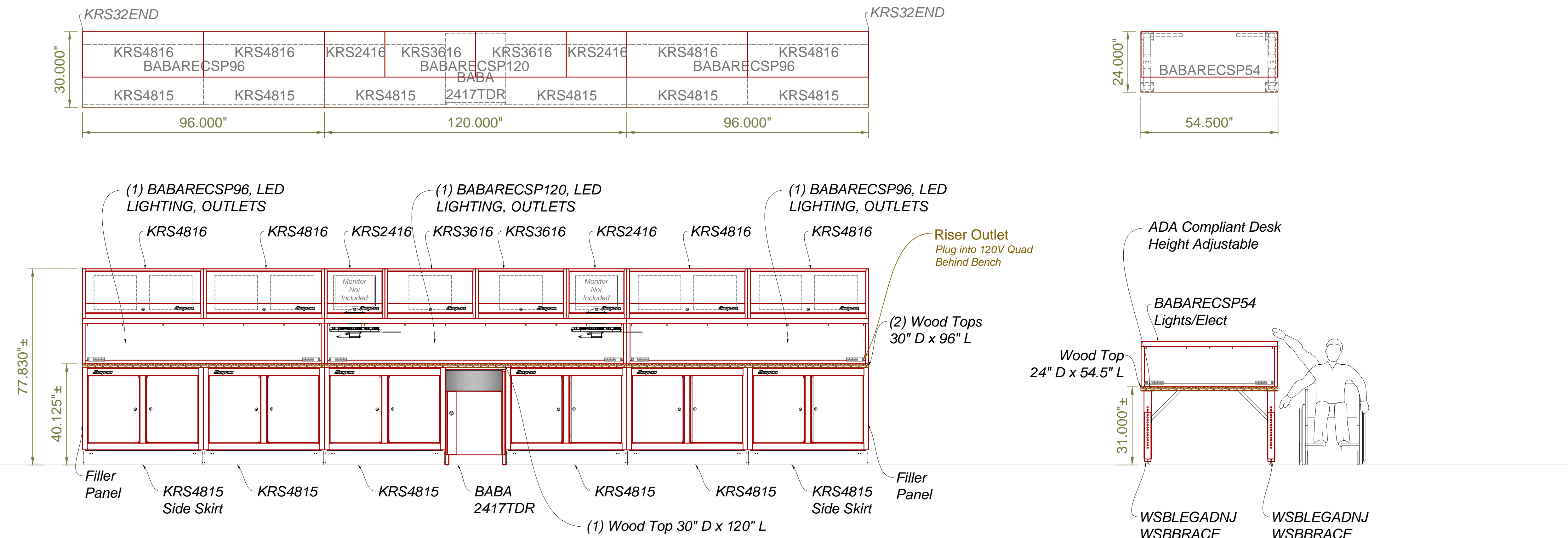
FOR CONSTRUCTION

Disclaimer
The drawings provided herein depict approximate measurement for placement of cabinets and equipment. Snap-on makes no representations or warranties relative to compliance with any building code requirements. Qualified architects, engineers, general contractors and construction consultants should be retained by the building owner and/or occupant prior to finalizing any construction plans.
In no event shall Snap-on, or its parent company(s), be liable for any special, indirect or consequential damages (including, without limitation, lost profits, revenues, anticipated sales, business opportunities or goodwill, interruption of business; or loss of business information) resulting from or arising out of reliance upon these drawings, even if it has been advised of the possibility of such damages.

DATE: _____
AUTHORIZED SIGNATURE: _____
SIGNATURE'S NAME: _____
DATE: 9/8/2021 1:02 PM
DRAWN: ALR
REVIEWED: _____
PROJECT NO: 20_80_042563
DRAWING NO: BAB-2.1

APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Auto Chassis/Tire Class/Lab 101 & Automotive Engine Lab 102 BAB 042563



I = 2 Units

- Each Unit Consists:
- (2) Wood Tops, 30" D x 96" L
 - (1) Wood Top, 30" D x 120" L
 - (6) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (1) KRS2417TDR Cabinet with Trash Door and Flapper
 - (2) BABARECSP96 Riser, LED Lights, Electric Outlets
 - (1) BABARECSP120 Riser, LED Lights, Electric Outlets
 - (4) KRS4816 Overhead Cabinets
 - (2) KRS3616 Overhead Cabinets
 - (2) KRS2416 Overhead Cabinets
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
 - (2) Compacc 3 Adjustable Key Board/Mouse Tray
 - (2) WSBKB Keyboard Bracket For Compacc and Riser
- Color: RED

J1 = 1 Unit

- ADA Work Station
- Each Unit Consists:
- (1) Wood Top, 24" D x 54.5" L
 - (1) BABARECSP54 Riser, LED Lights, Electric Outlets
 - (2) WSBLEGADNJ Adj. Bench Legs, ADA Compliant 28.762" H - 42.762" H
 - (2) WSBBRACE 18" Leg Brace
- Color: RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

Disclaimer:
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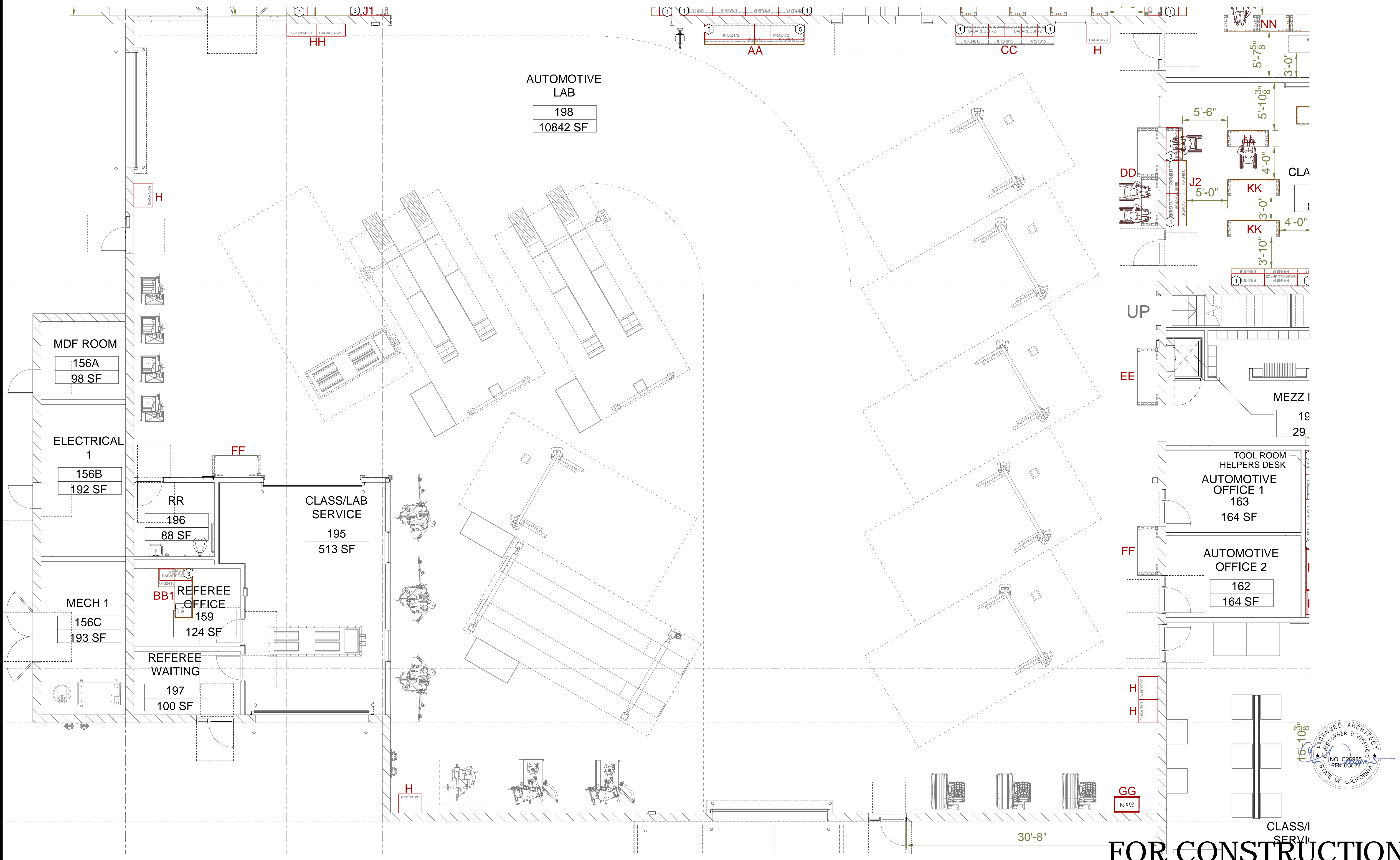
Regional Manager
TONY SHASHA
1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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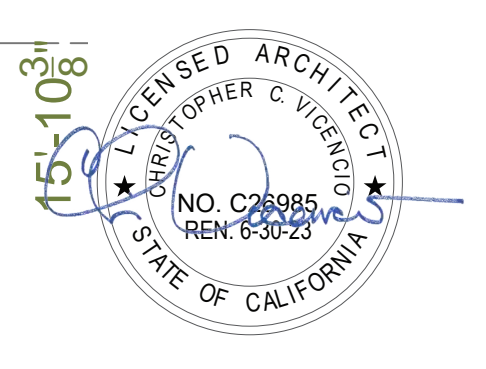
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DRAWING NO: BAB-2.2

APPENDIX 02 EQUIPMENT FURNISHINGS



Regional Manager
TONY SHASHA
 1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
 FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
 XX



FOR CONSTRUCTION

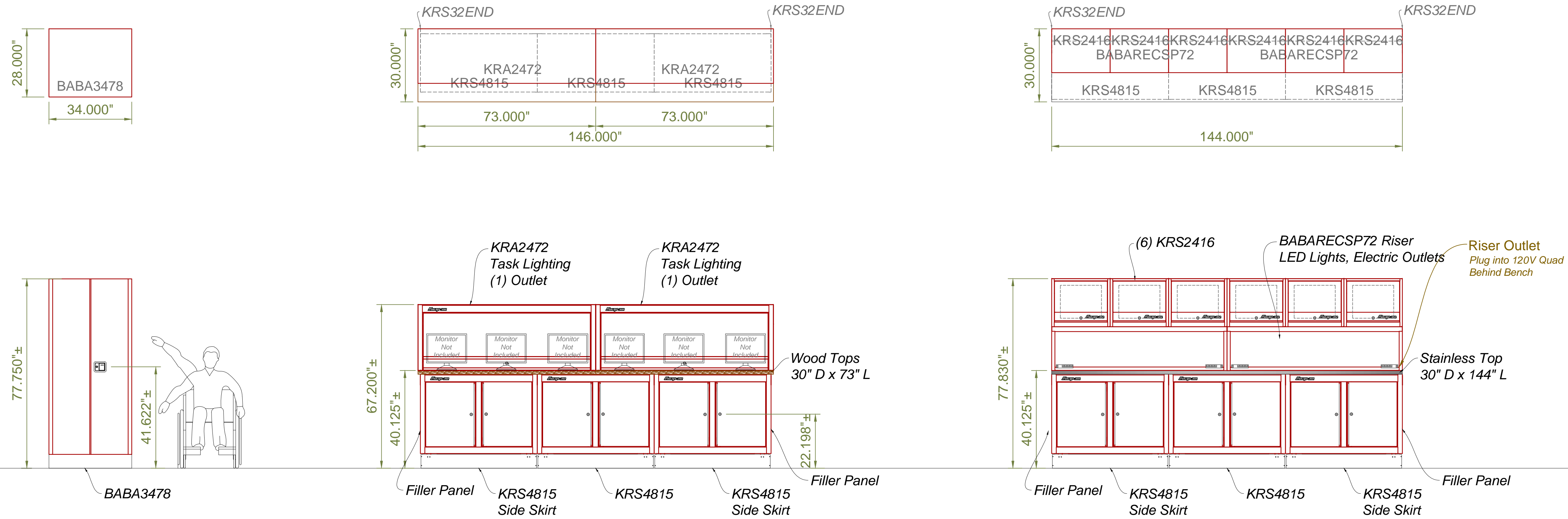
SERVICE PLAN
 3/16" = 1'-0" (24" x 36")

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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Automotive Lab 198 BAB 042563



H = 5 Units

- Each Unit Consists:
 (1) BABA3478 Tall Cabinet
 34" W x 28" D x 77.75" H
 (5) Adjustable Shelves
 Lockable
 Color: RED

AA = 1 Unit

- Each Unit Consists:
 (1) Wood Top, 30" D x 144" L
 (3) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 (2) KRA2472 Workstation, Task Lighting and (1) Electric
 Outlet in Each Cabinet
 (1) KSSKRT24SET Side Skirt Set
 Color: RED

CC = 1 Unit

- Short Term Student Tool Storage
 Each Unit Consists:
 (1) Stainless Top, 30" D x 144" L
 (3) KRS4815 Bulk Cabinet
 (6) KRS2416 Overhead Cabinet
 (2) BABARECSP72 Riser, LED Lights, Electric Outlets
 (1) KSSKRT24SET Side Skirt Set
 (2) KRS32END Filler Panels
 Color: RED



SERVICE PLAN
 1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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Regional Manager
 TONY SHASHA
 1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
 FOR
 COLLEGE OF ALAMEDA AUTOMOTIVE
 XX

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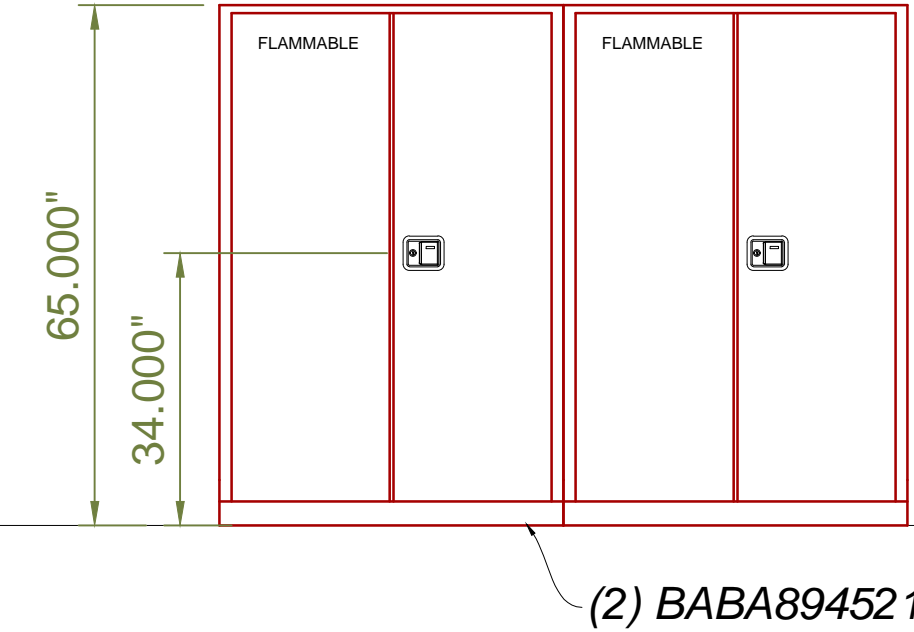
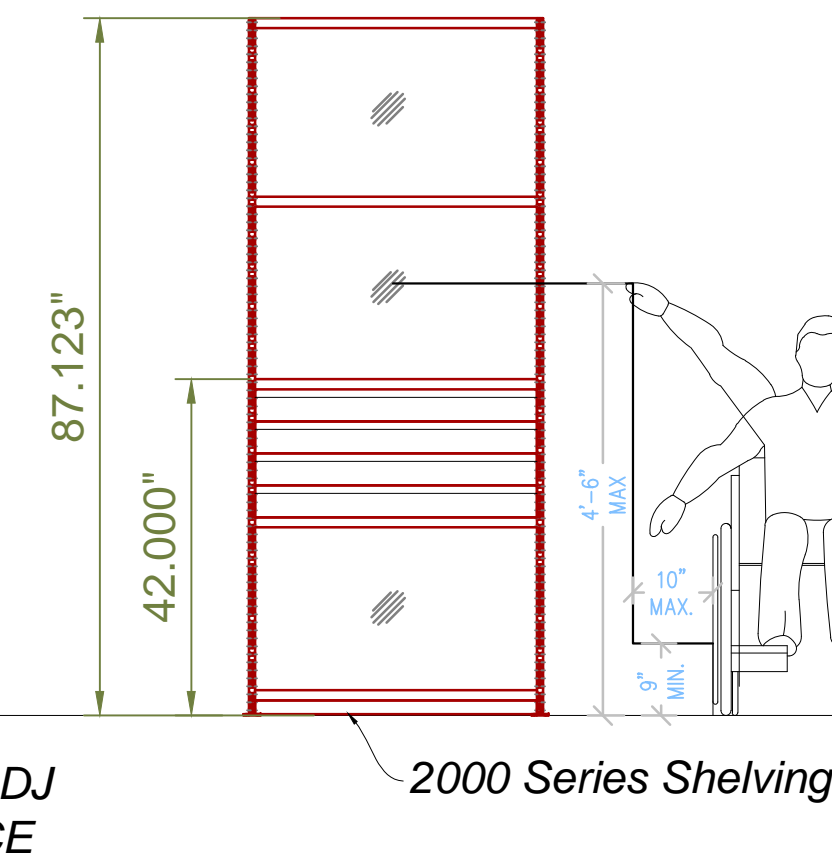
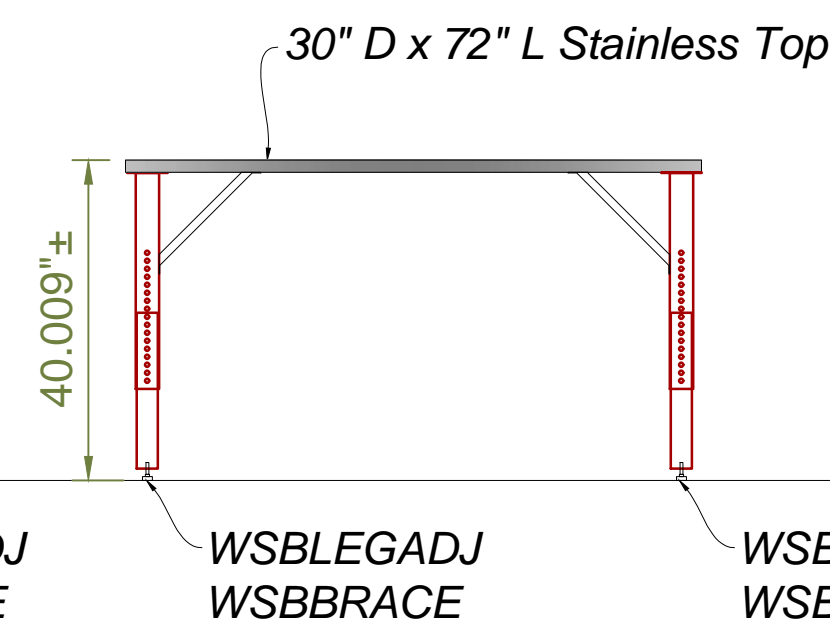
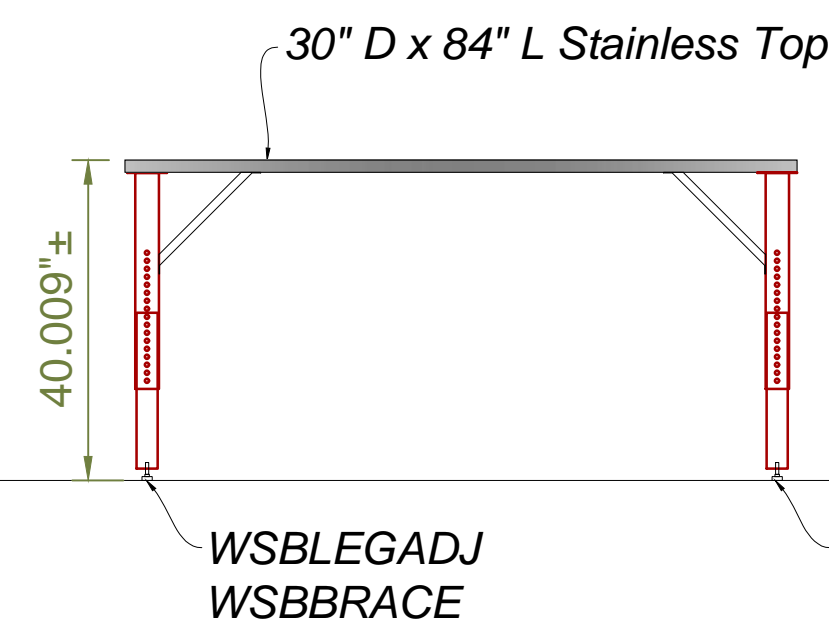
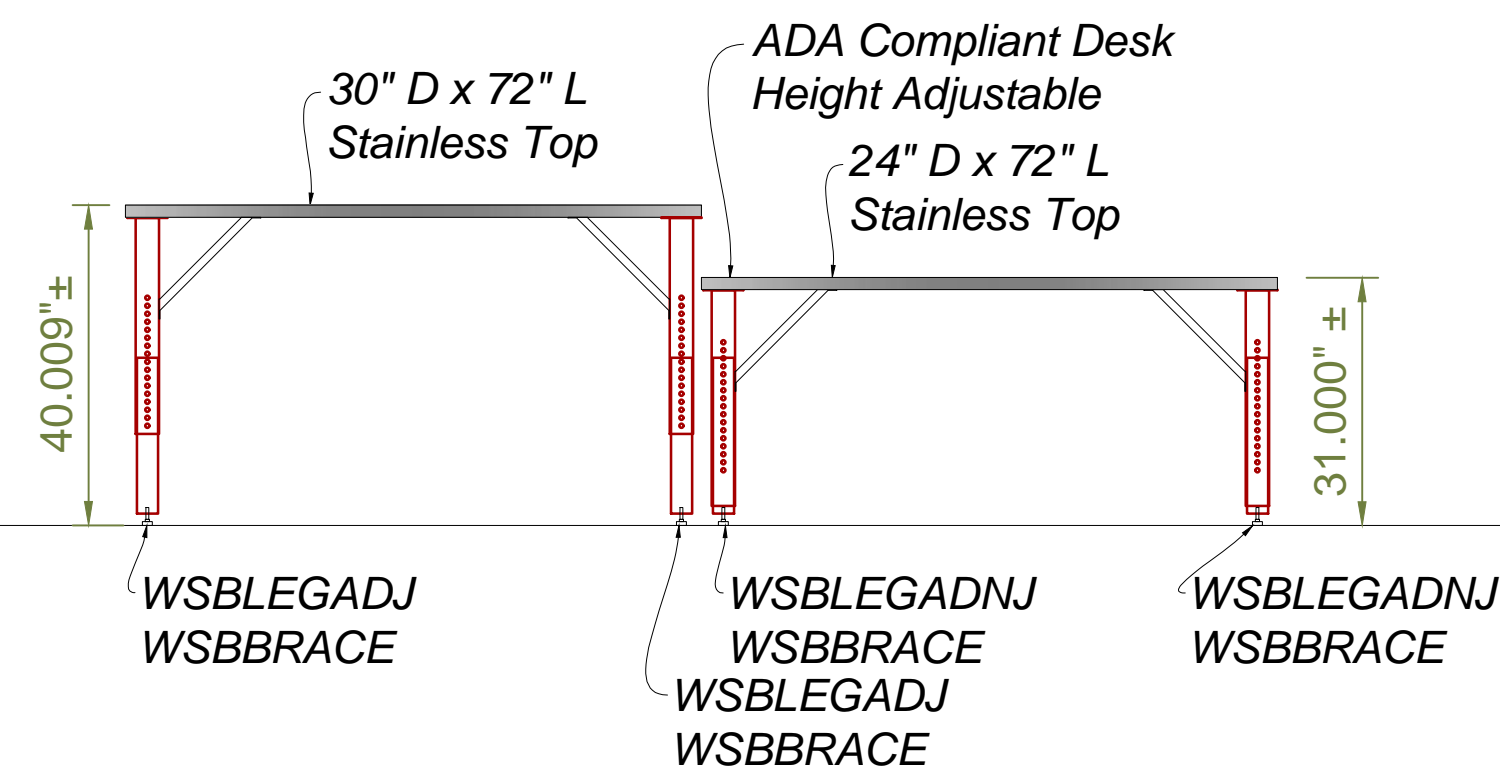
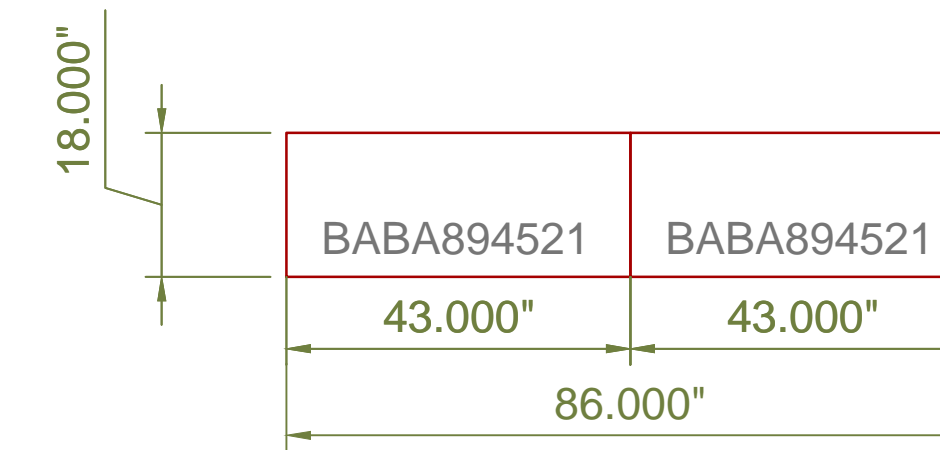
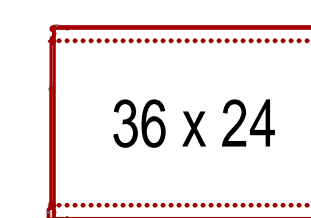
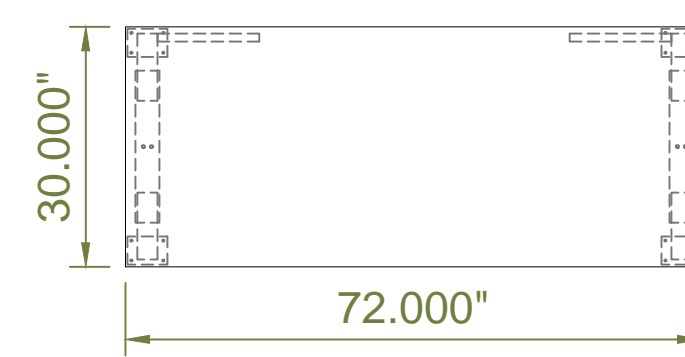
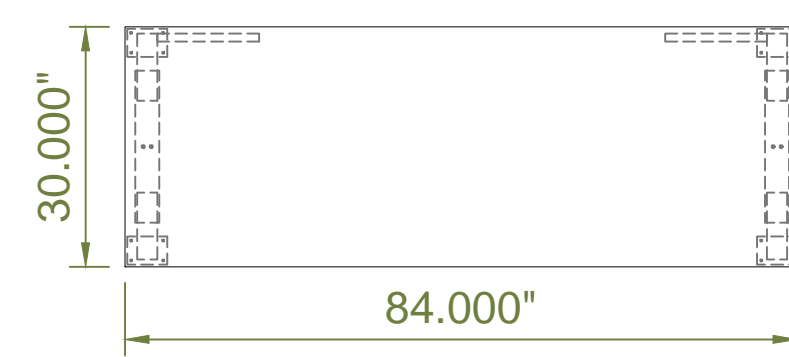
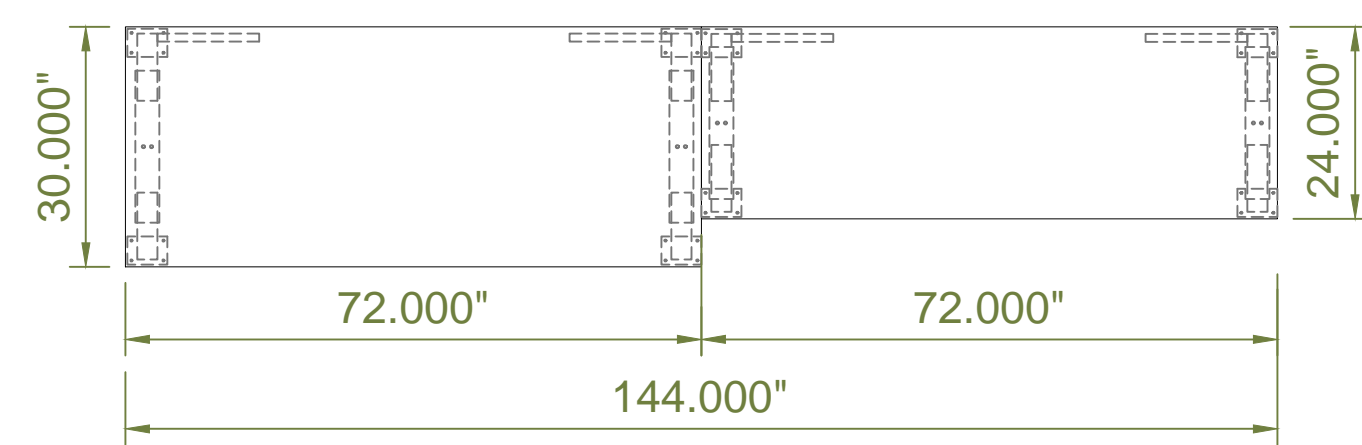
APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Automotive Lab 198 BAB 042563



Regional Manager
TONY SHASHA
1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX



DD = 1 Unit

ADA Work Station
Each Unit Consists:
(1) Stainless Top, 30" D x 72" L
(2) WSBLEGADJ Adjustable Leg
(2) WSBLEGADNJ Adj. Desk Leg - ADA Compliant
(4) WSBBRACE 18" Leg Brace
Color: RED

EE = 1 Unit

Each Unit Consists:
(1) Stainless Top, 30" D x 84" L
(2) WSBLEGADJ Adjustable Leg
(2) WSBBRACE 18" Leg Brace
Color: RED

FF = 2 Units

Each Unit Consists:
(1) Stainless Top, 30" D x 84" L
(2) WSBLEGADJ Adjustable Leg
(2) WSBBRACE 18" Leg Brace
Color: RED

GG = 1 Unit

Tire Balancing/Repair Tools Supplies
Each Unit Consists:
(1) 2000 Series Shelving
36" W x 24" D x 87" H
(5) Adjustable Shelves
(4) 4" Drawers
Enclosed Sides/Back
Color: RED

HH = 1 Unit

Each Unit Consists:
(2) BABA894521 Flammable Cabinet
43" W x 18" D x 65" H
90 Gallon Capacity
Self-Closing Safety Cabinet
Two Doors
Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

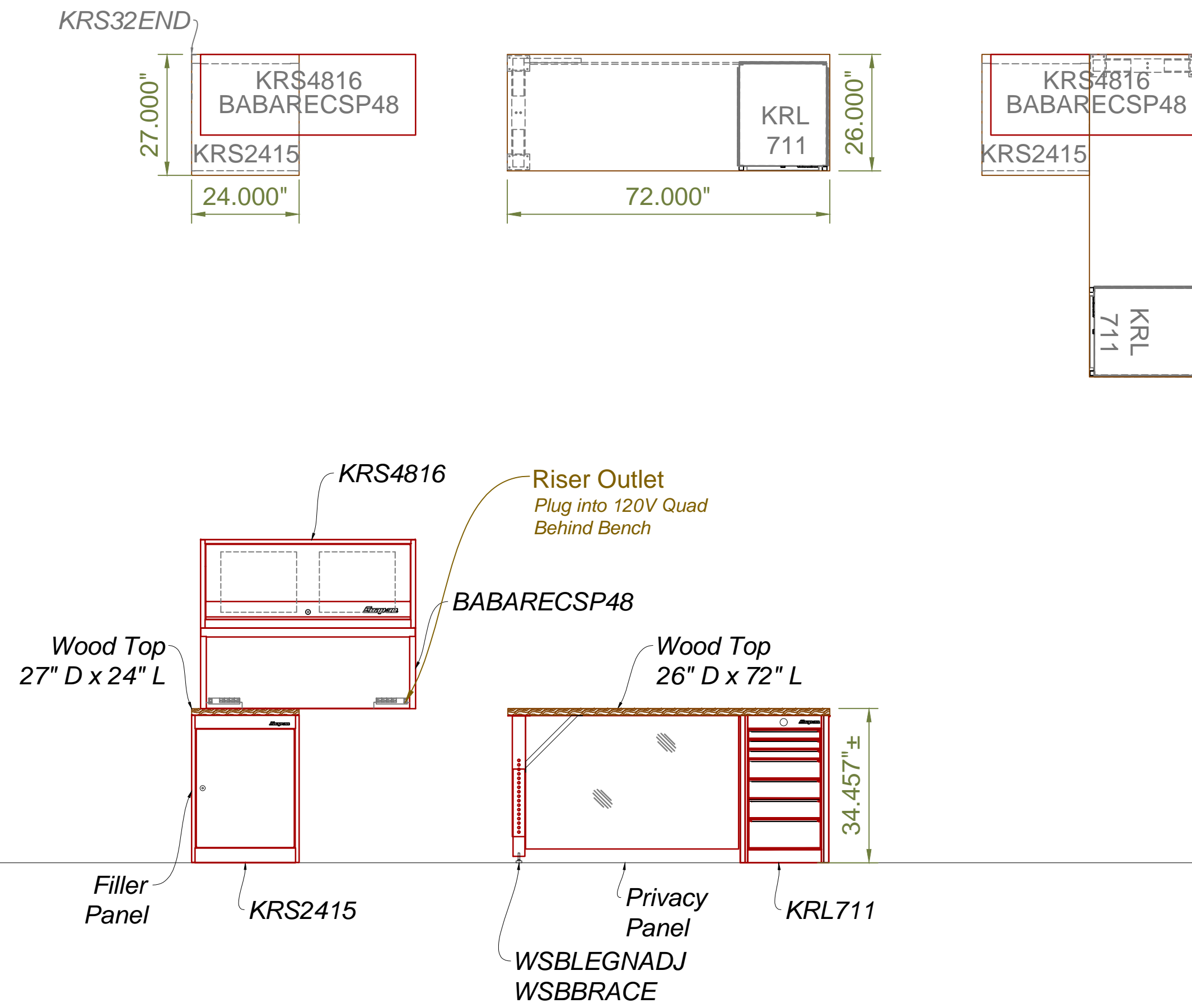
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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda
Referee Office 159
BAB 042563



BB1 = 1 Unit

- Each Unit Consists:
- (1) Wood Top 26" D x 72" L
 - (1) Wood Top 27" D x 24" L
 - (1) KRL711 Standard Drawer - No Base
 - (1) KRS2415 Bulk Cabinet - No Base
 - (1) Custom Privacy Panel
 - (1) BABARECSP48 Riser, Task Lighting, Outlets
 - (1) KRS4816 Overhead Cabinet
 - (1) WSBLEGNADJ Adjustable Leg
 - (1) WSBBRACE 18" Leg Brace
- Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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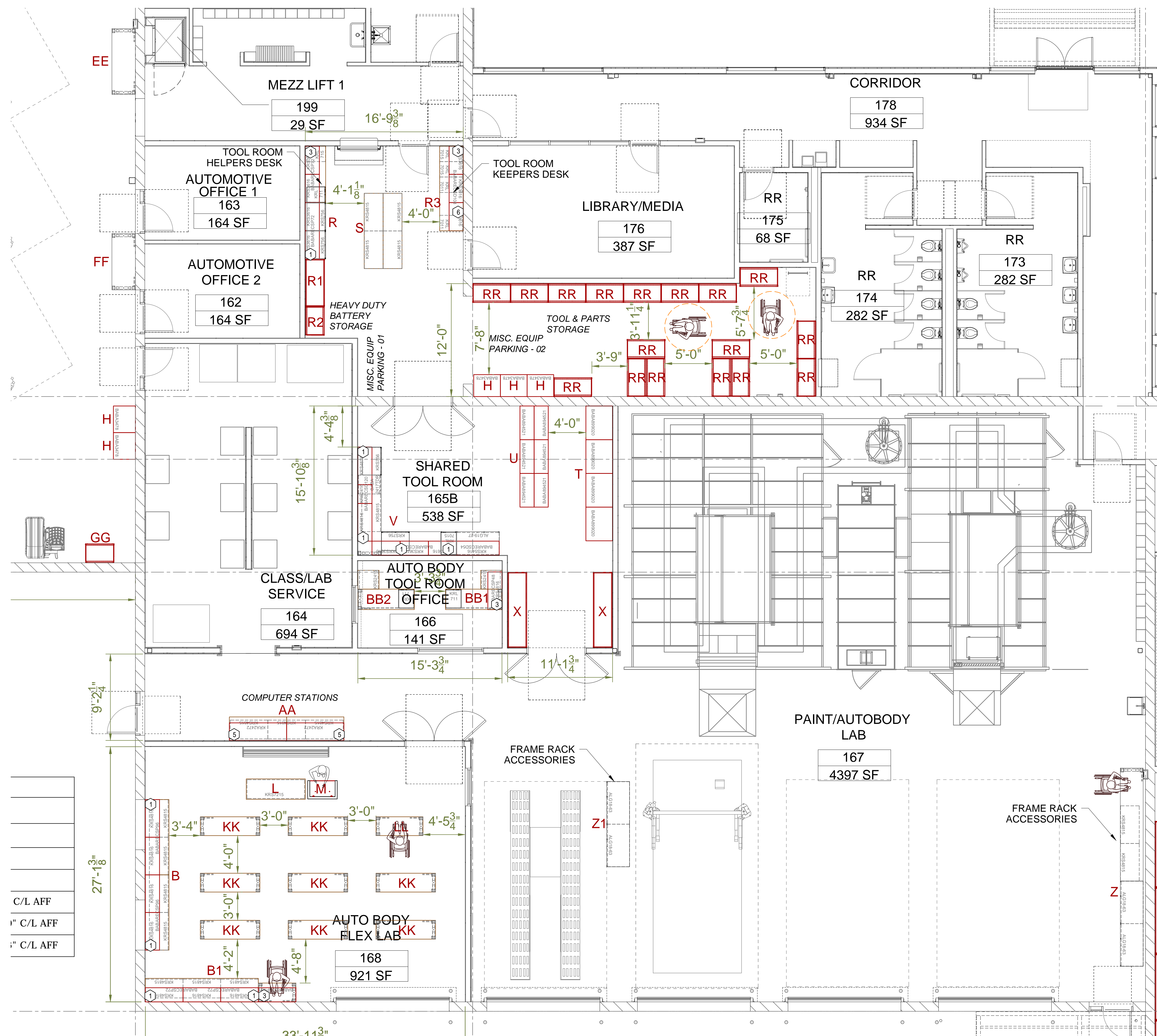
Regional Manager
TONY SHASHA
1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

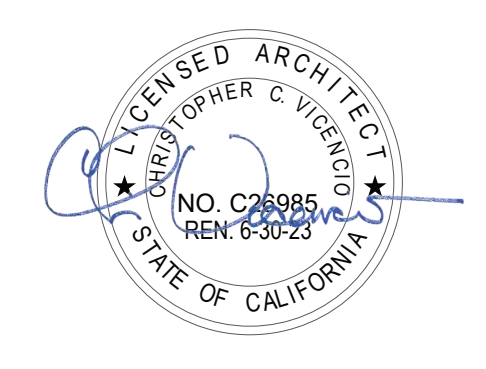
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APPENDIX 02 EQUIPMENT FURNISHINGS



C/L AFF
1" C/L AFF
1" C/L AFF



SERVICE PLAN
 3/16" = 1'-0" (24" x 36")
FOR CONSTRUCTION

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Regional Manager
TONY SHASHA
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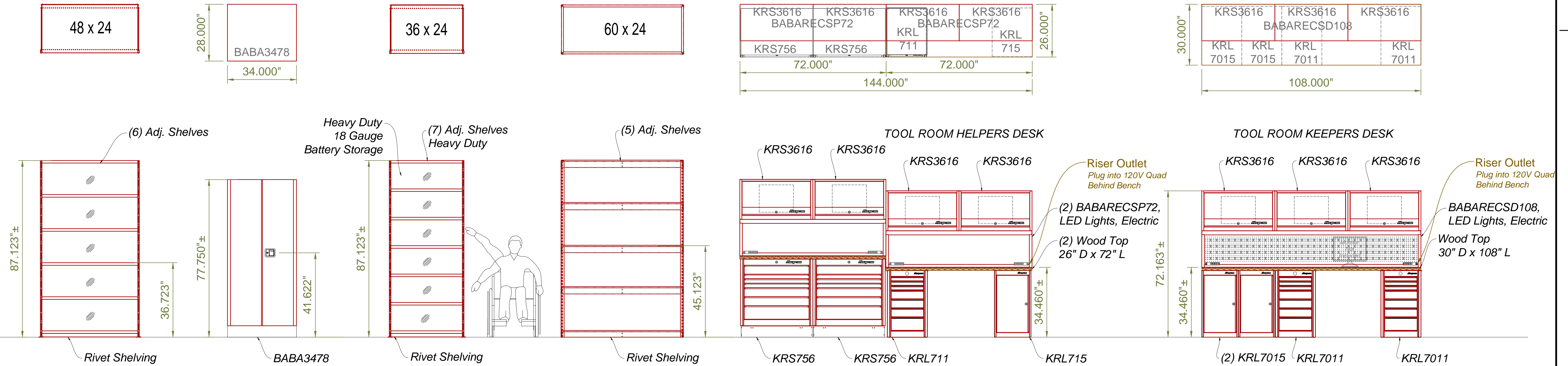
BUILD-A-BAY EQUIPMENT PLAN
 FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Shared Tool Room BAB 042563



RR = 17 Units

Each Unit Consists:
(1) Rivet Shelving Unit
48" W x 24" D x 87" H
Enclosed Back and Sides
(6) Adjustable Shelves
Color: RED

H = 3 Units

Each Unit Consists:
(1) BABA3478 Tall Cabinet
34" W x 28" D x 77.75" H
(5) Adjustable Shelves
Lockable
Color: RED

R2 = 1 Unit

Tool Room Helpers Desk
& Battery Storage
Each Unit Consists:
(1) Rivet Shelving
Heavy Duty
Battery Storage
18 Gauge
(7) Adjustable Shelves
Closed Back and Sides
Color = RED

R1 = 1 Unit

Tool Room Helpers Desk
& Battery Storage
Each Unit Consists:
(1) Rivet Shelving Unit
(5) Shelves
Open Sides and Back
Color = RED

R = 1 Unit

Tool Room Helpers Desk & Battery Storage
Each Unit Consists:
(2) Wood Tops 26" D x 72" L
(1) KRL711 Standard Drawer - No Base
(1) KRL715 Bulk Cabinet - No Base
(2) KRS756 Tool Boxes
(2) BABARECSP72 Riser, LED Lights, Electric
(4) KRS3616 Overhead Cabinets
(1) WPSR6024S Rivetier Shelving Unit
(5) Shelves
Open Sides and Back
(1) WPSEK20866 Deluxe Heavy Duty Battery Storage
18 Gauge
(7) Adjustable Shelves
Closed Back and Sides
Color = RED

R3 = 1 Unit

Tool Room Keepers Desk
Each Unit Consists:
(1) Wood Top, 26" D x 108" L
(2) KRL7011 Standard Drawer - No Base
(2) KRL7015 Bulk Cabinet - No Base
(1) BABARECSD108 Riser Slots-N-Dots,
LED Lights, Electric Outlets
(3) KRS3616 Overhead Cabinets
Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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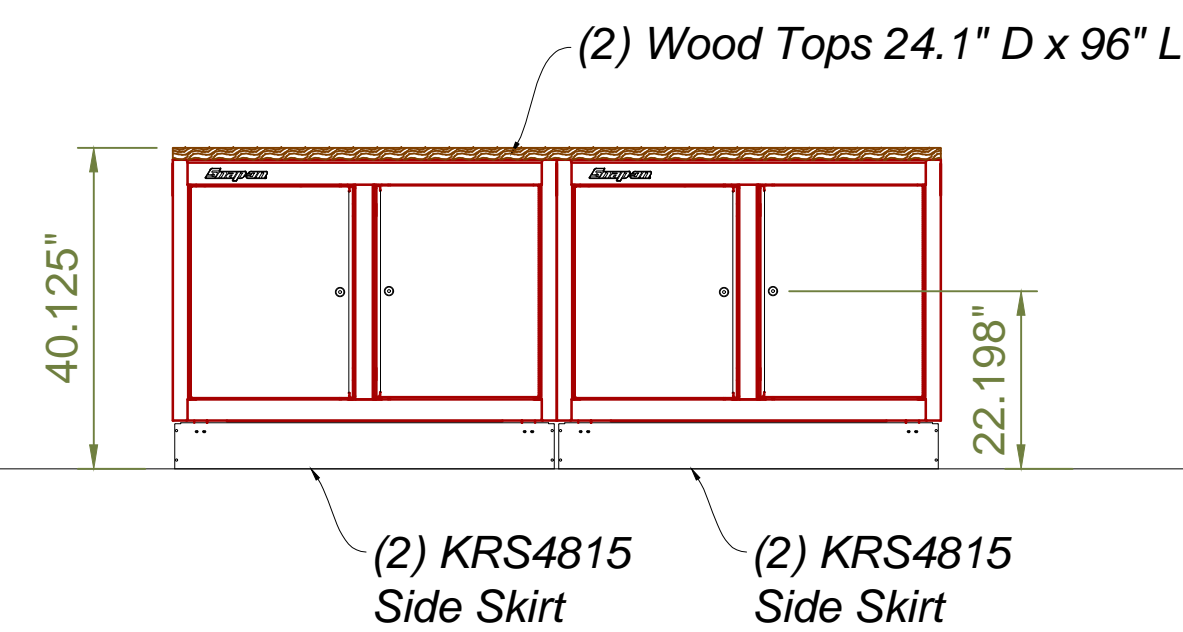
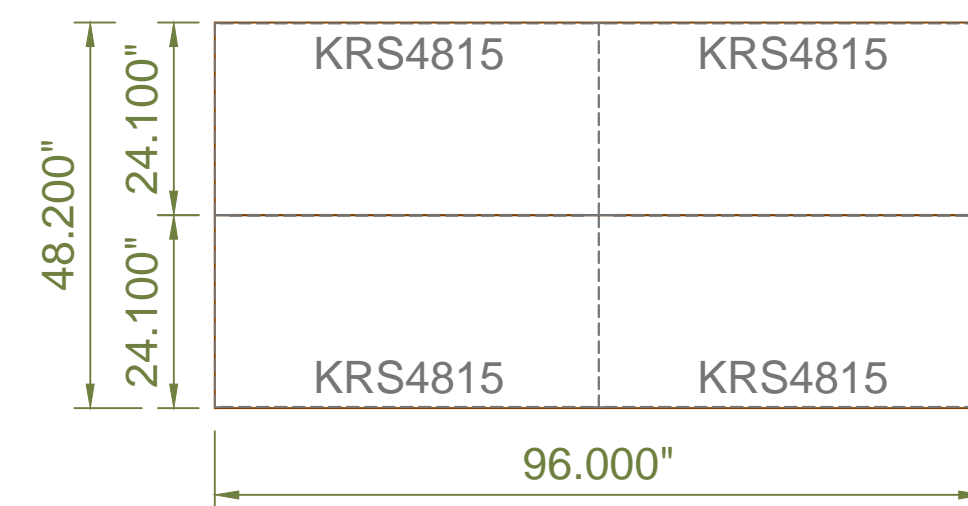
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Regional Manager
TONY SHASHA
1-562-335-0289
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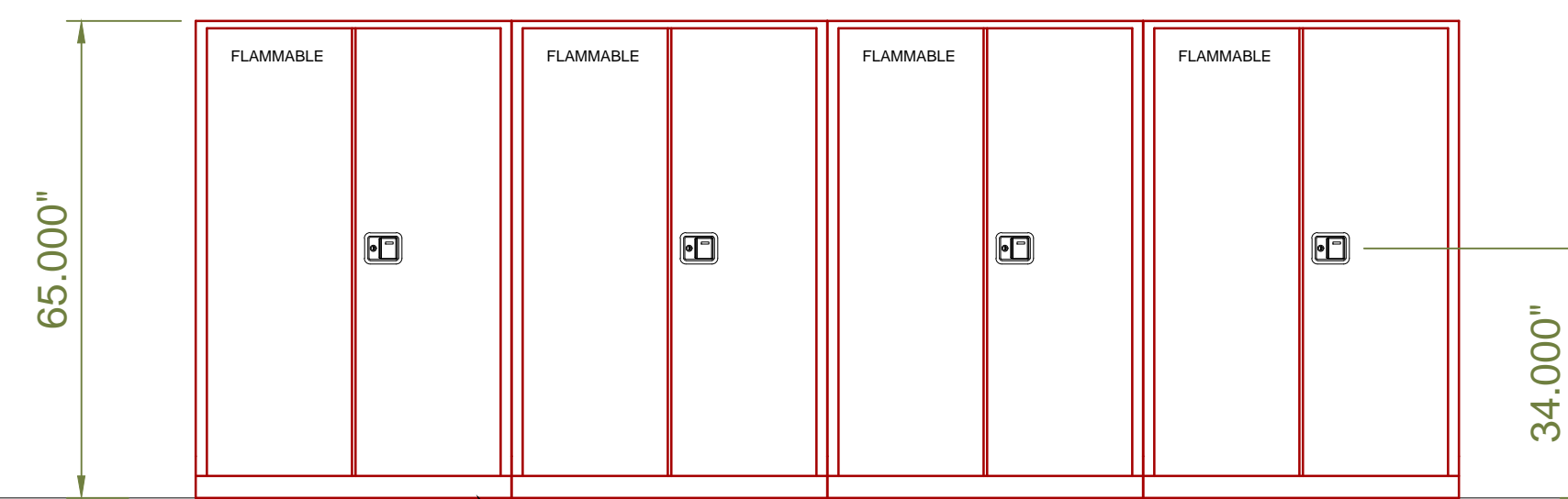
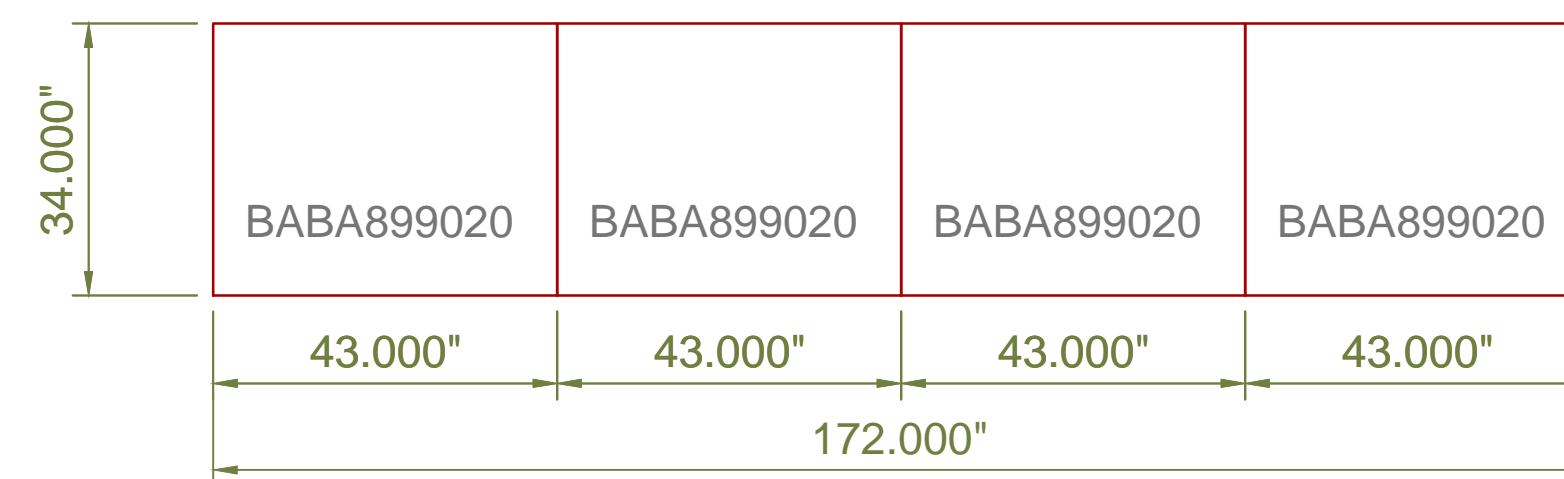
APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Body Shop Tool Room 165B/Shared Tool Room BAB 042563



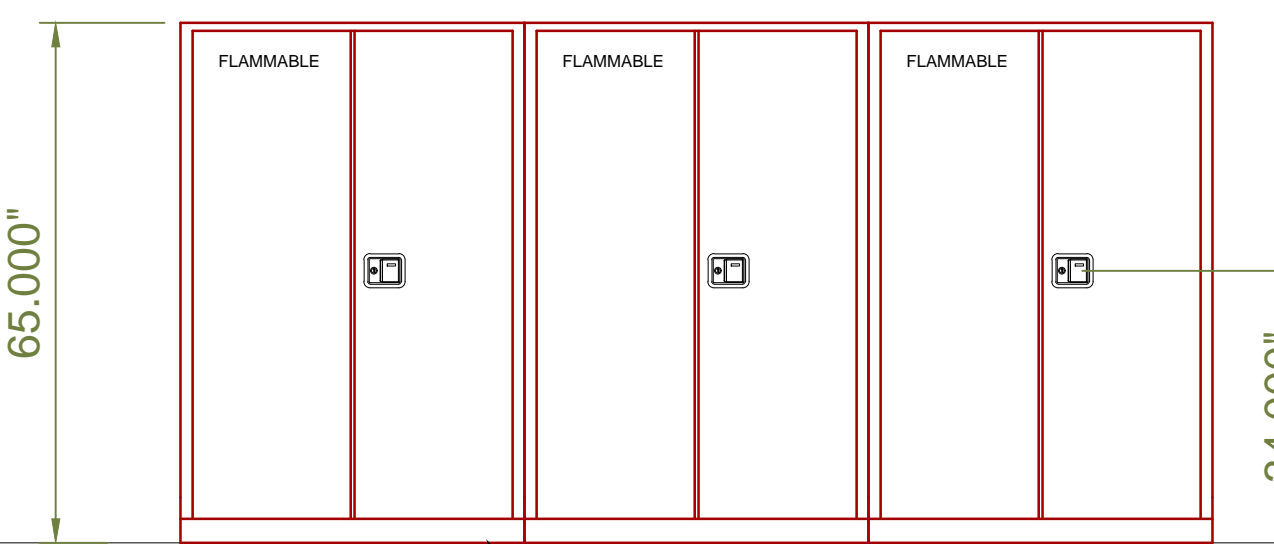
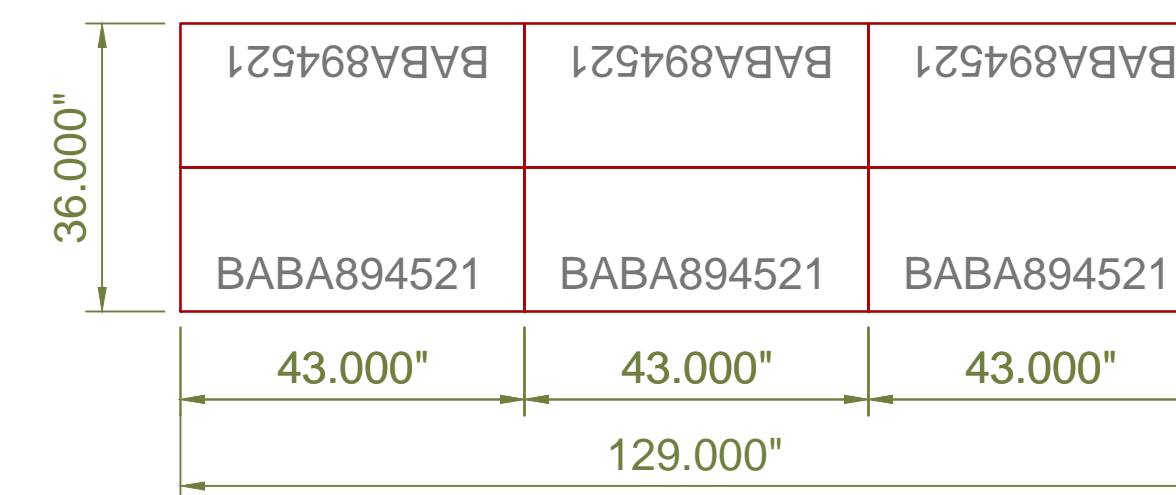
S = 1 Unit

Each Unit Consists:
 (2) Wood Tops, 24.1" D x 96" L
 (4) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 (2) KSSKRT24SET Side Skirt Set
 Color: RED



T = 1 Unit

Each Unit Consists:
 (4) BABA899020 Flammable Cabinet
 43" W x 34" D x 65" H
 90 Gallon Capacity
 Self-Closing Safety Cabinet
 Two Doors
 Color = RED



U = 1 Unit

Each Unit Consists:
 (6) BABA894521 Flammable Cabinet
 43" W x 18" D x 65" H
 90 Gallon Capacity
 Self-Closing Safety Cabinet
 Two Doors
 Color = RED



SERVICE PLAN
 1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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 1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
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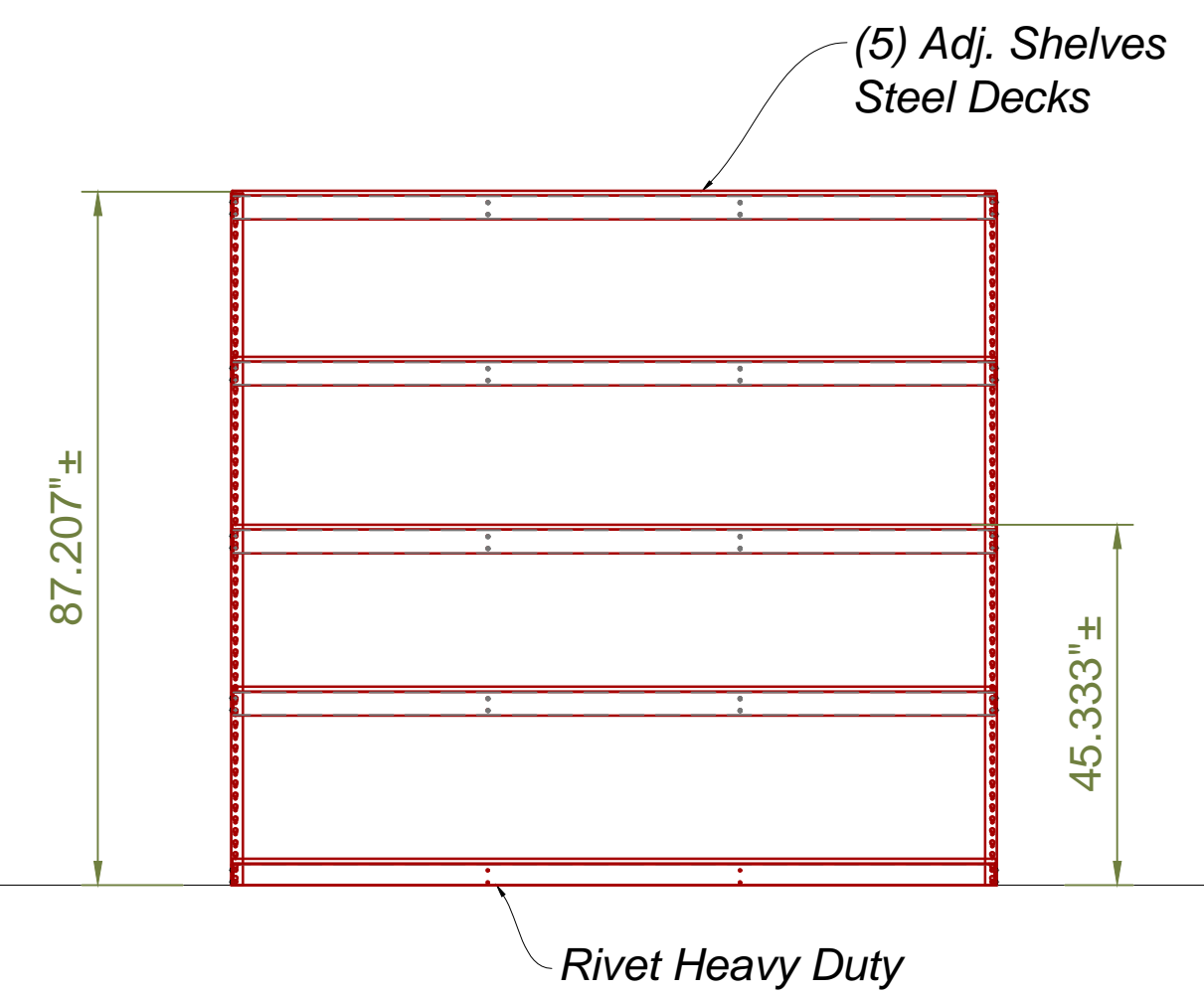
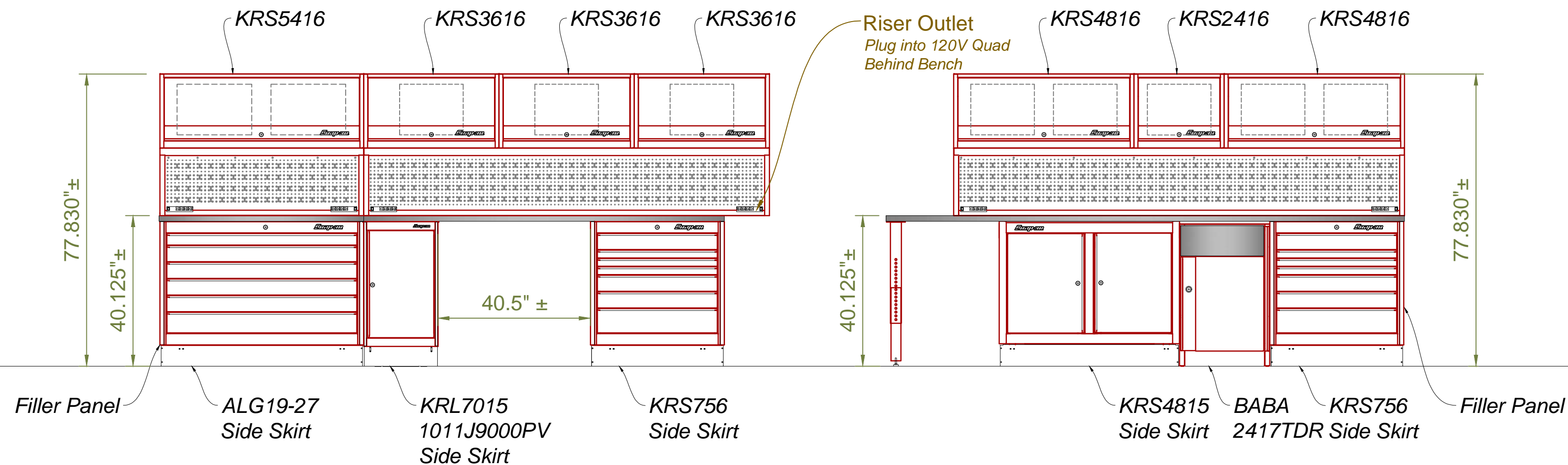
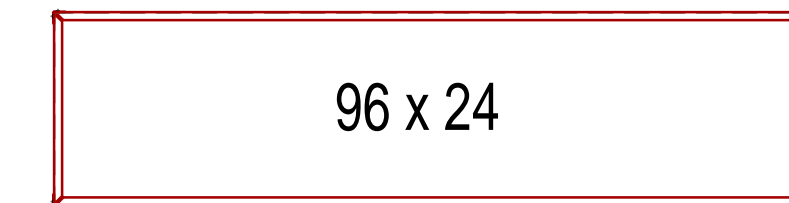
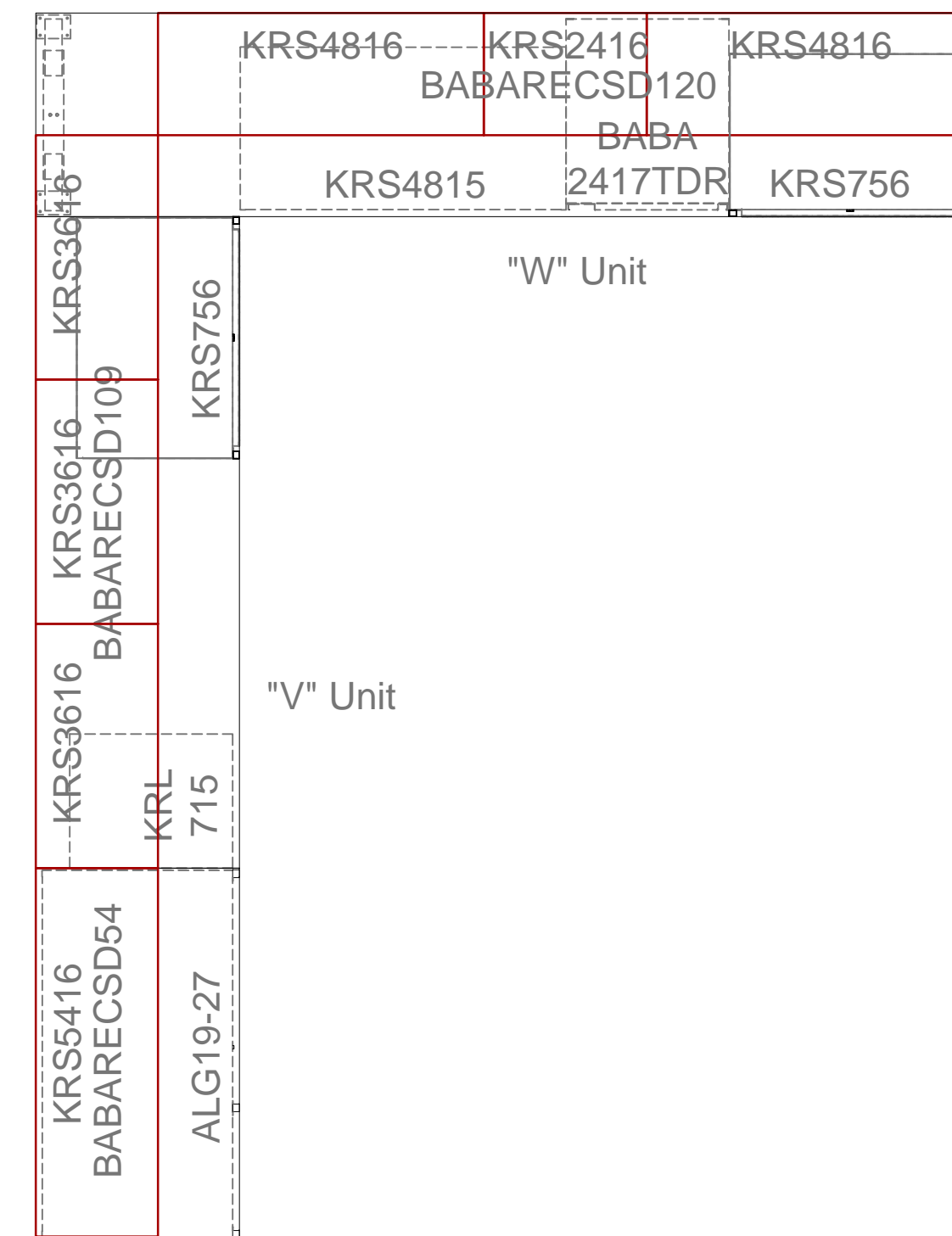
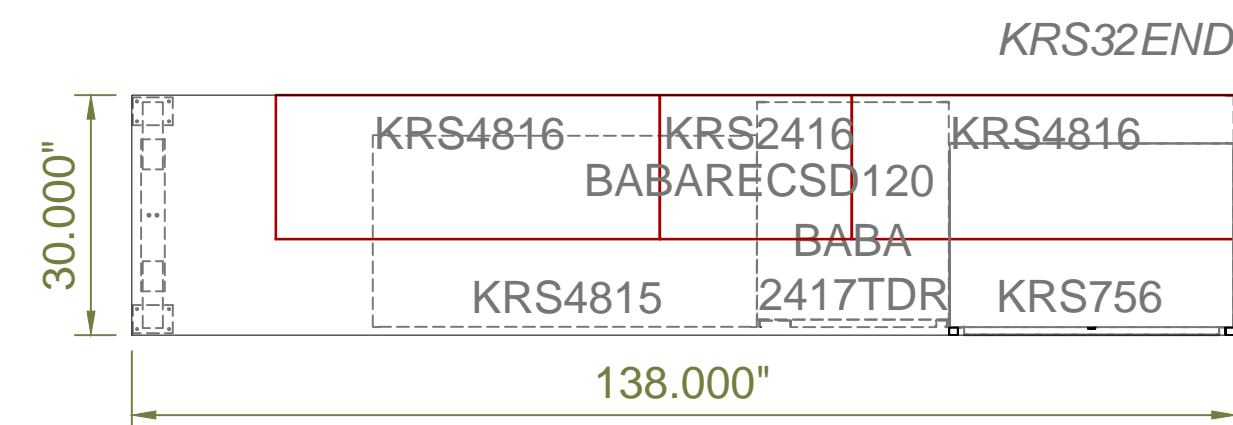
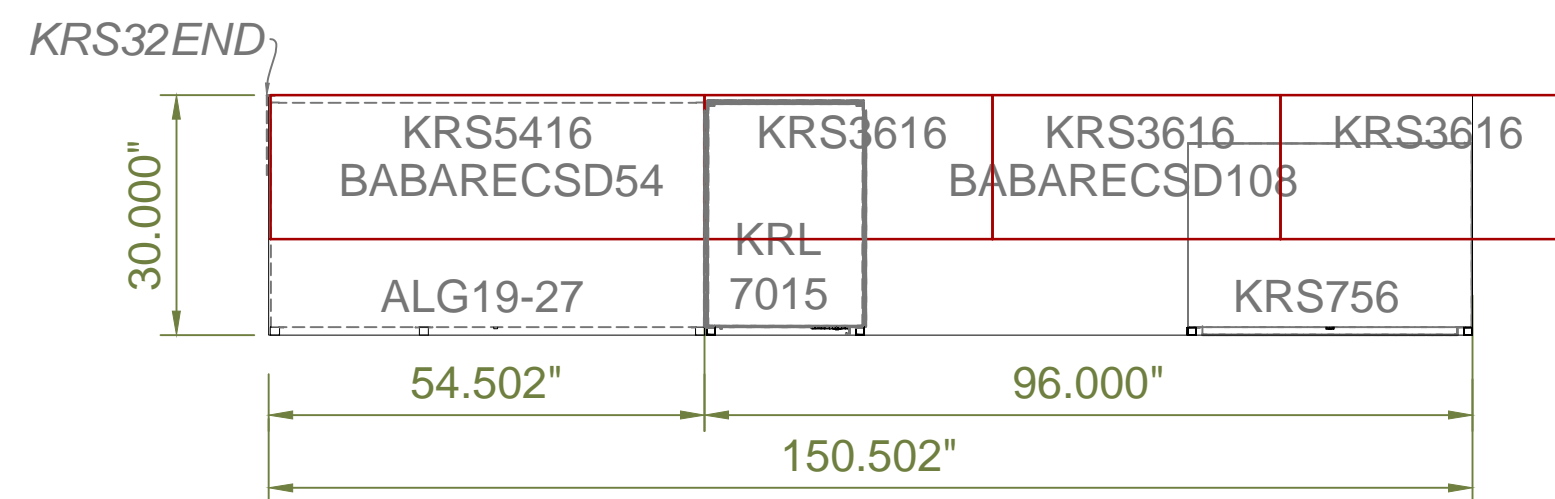
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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Body Shop Tool Room 165B BAB 042563



Regional Manager
TONY SHASHA
1-562-335-0289



V = 1 Unit

Each Unit Consists:

- (1) Stainless Top, 30" D x 54.502" L
 - (1) Stainless Top, 30" D x 96" L
 - (1) Stainless Top, 30" D x 138" L
 - (1) KRL7015 Cabinet
 - (1) 1011J9000PV Base
 - (1) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (1) KRS2417TDR Cabinet with Trash Door and Flapper
 - (2) KRS756 Tool Box
 - (1) ALG19-27 Modified KRS7022 Tool Box
 - Drawers: (1) 3", (4) 4", (1) 5"
 - (1) BABARECSD108 Slots-N-Dots Riser, LED Lights, Electric Outlets
 - (1) BABARECSD56 Slots-N-Dots Riser, LED Lights, Electric Outlets
 - (1) BABARECSD120 Slots-N-Dots Riser, LED Lights, Electric Outlets
 - (2) KRS4816 Overhead Cabinets
 - (1) KRS5416 Overhead Cabinets
 - (3) KRS3616 Overhead Cabinets
 - (1) KRS2416 Overhead Cabinet
 - (2) KRS32END Filler Panel
 - (1) KSSKRT24PVR Side Skirt
 - (1) KSSKRT24SET Side Skirt Set
 - (1) KSSKRT29SET Side Skirt Set
 - (1) WSBLEGADJ Adjustable Leg
- Color: RED

X = 2 Units

Each Unit Consists:

- (1) Rivet Shelving Unit
 - Heavy Duty
 - 96" W x 24" D x 87" T
 - (5) Adj. Shelves, Steel Decking
 - Open Back/Sides
- Color: RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

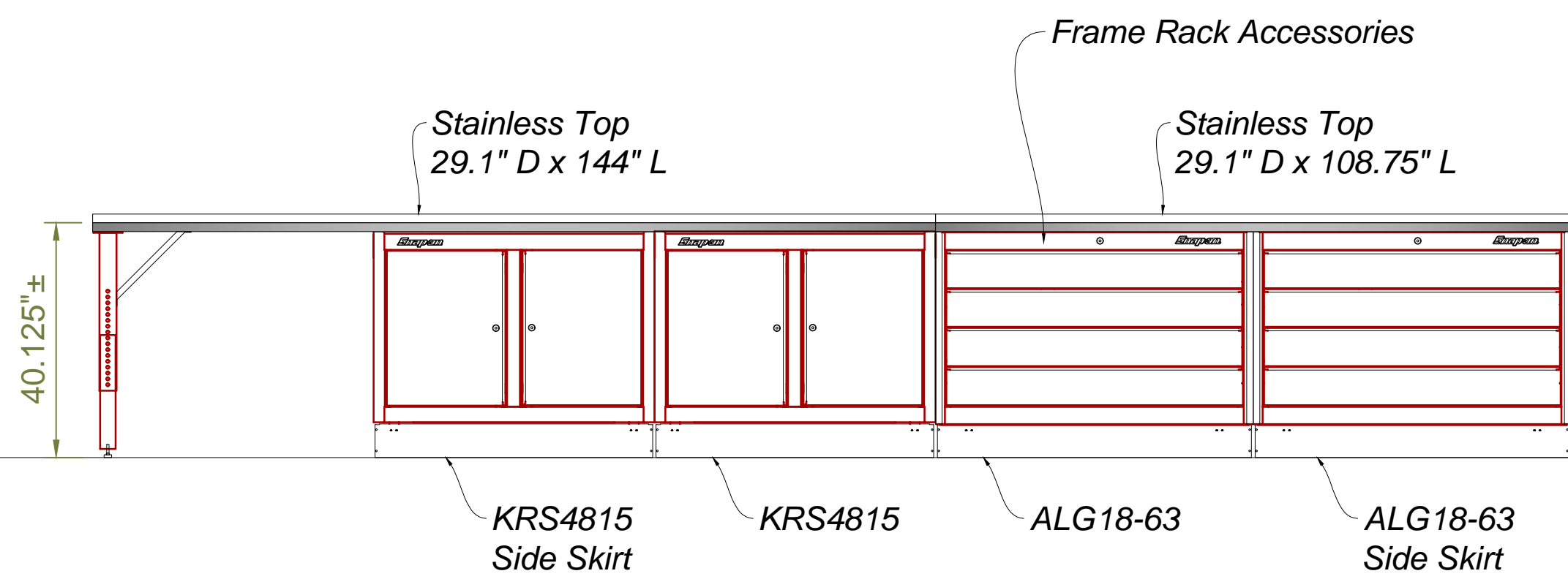
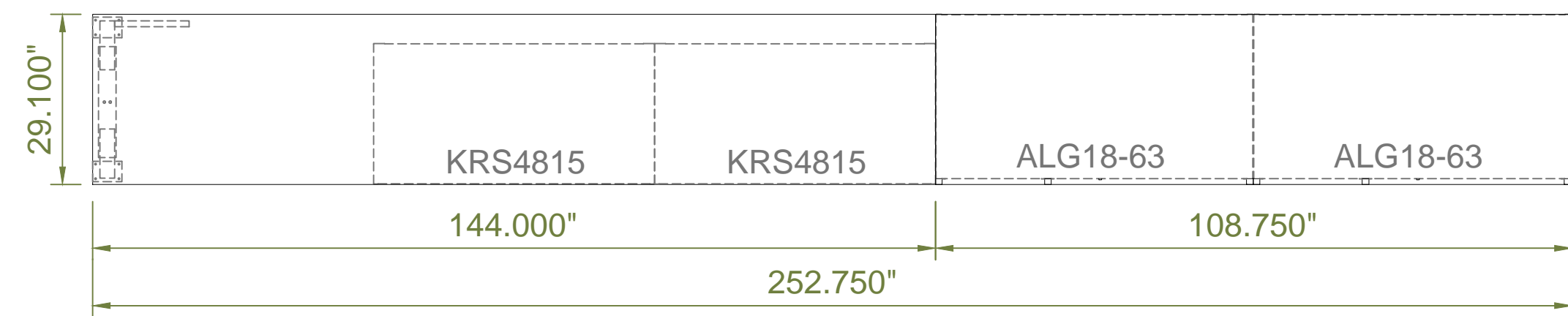
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BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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APPENDIX 02 EQUIPMENT FURNISHINGS

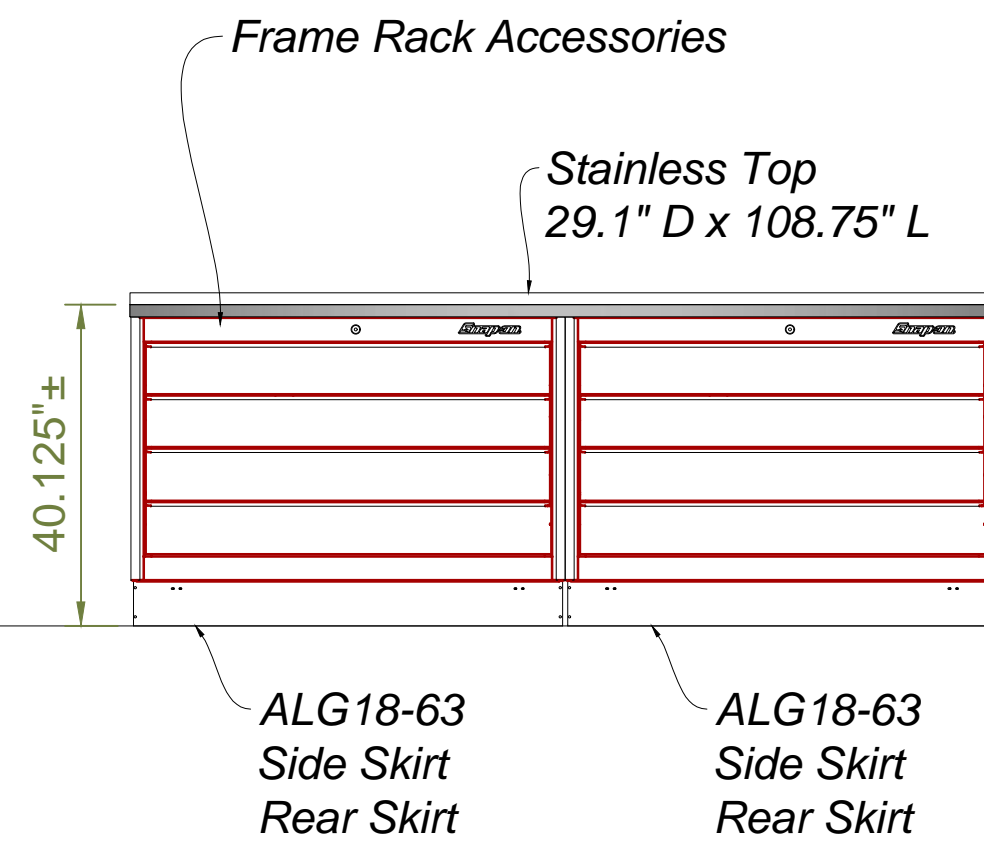
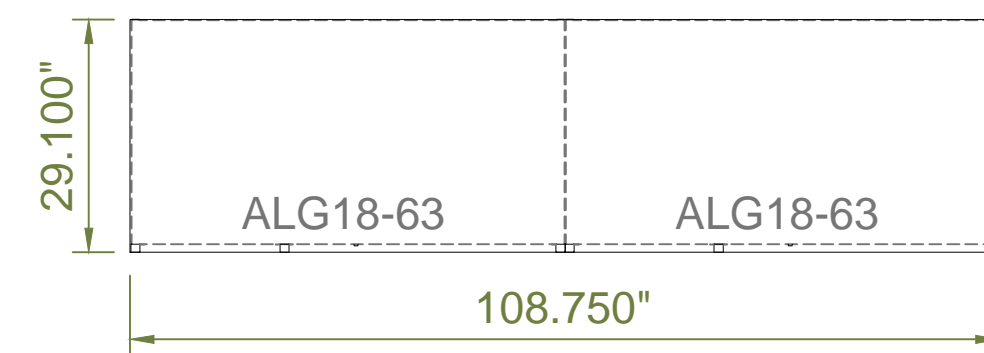
College Of Alameda Body Shop BAB 042563



Z = 1 Unit

Each Unit Consists:

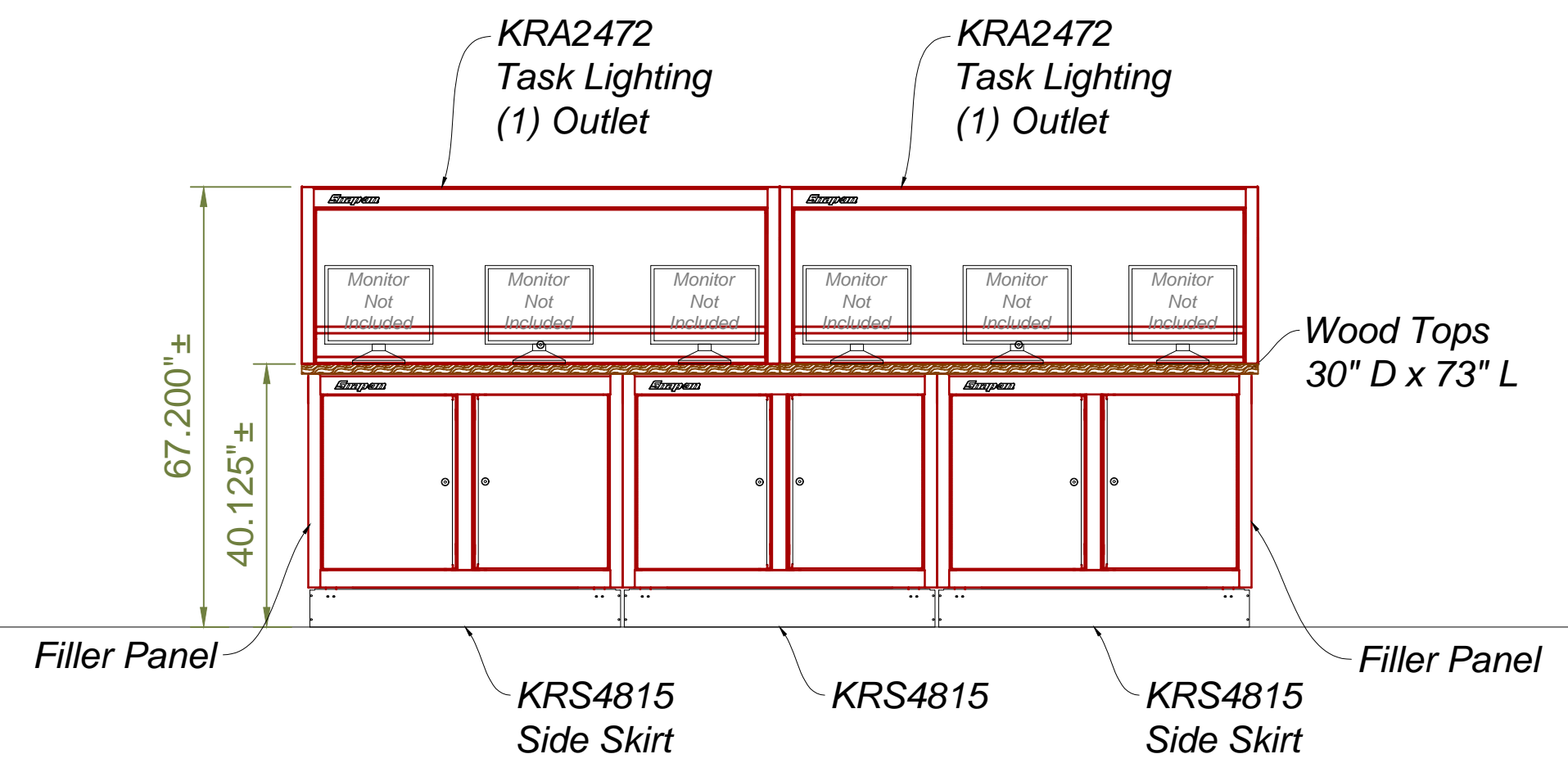
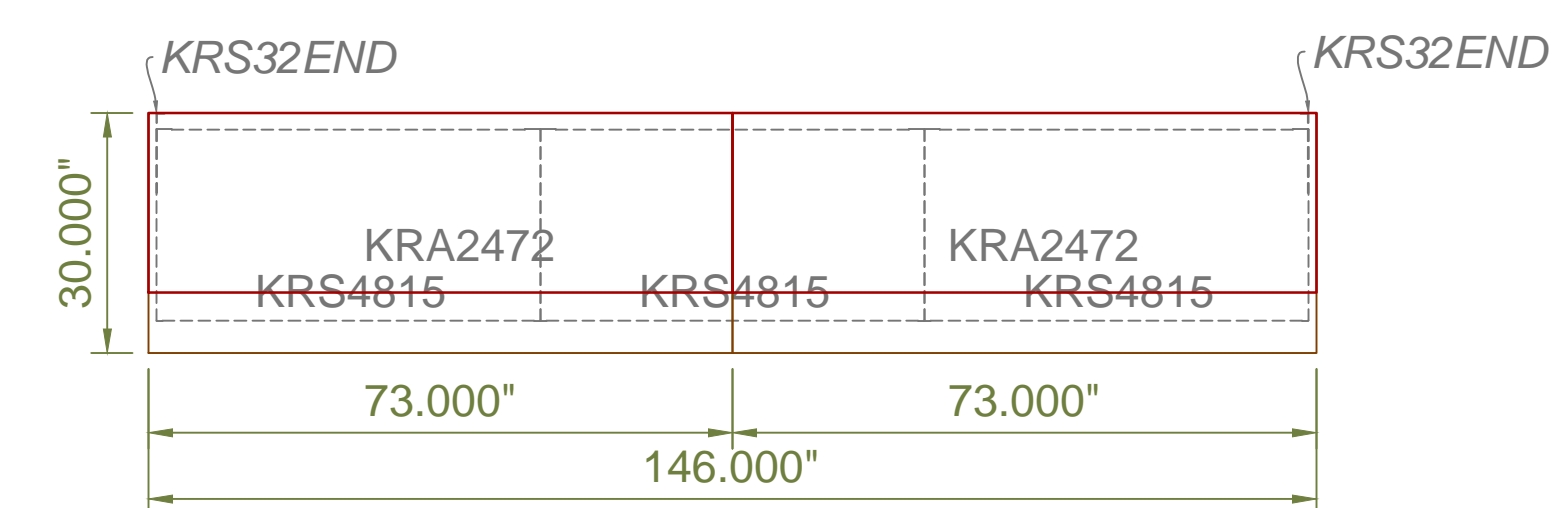
- (1) Stainless Top Turned Up Back Splash 29.1" D x 144" L
 - (1) Stainless Top Turned Up Back Splash 29.1" D x 108.75" L
 - (2) KRS4815 Bulk Cabinet, 1 Slide Out Shelf Per Door
 - (2) ALG18-63 Modified KRS7022 Tool Boxes
 - (4) 6" Drawers
 - (1) KSSKRT24PVR Side Skirt
 - (1) KSSKRT29PVR Side Skirt
 - (1) WSBLEGADJ Adjustable Leg
 - (1) WSBBRACE 18" Leg Brace
- Color: RED



Z1 = 1 Unit

Each Unit Consists:

- (1) Stainless Top Turned Up Back Splash 29.1" D x 108.75" L
 - (2) ALG18-63 Modified KRS7022 Tool Boxes
 - (4) 6" Drawers
 - (1) KSSKRT29SET Side Skirt Set
 - (2) KFSKRT54SET Rear Skirts
- Color: RED



AA = 1 Unit

Each Unit Consists:

- (1) Wood Top, 30" D x 144" L
 - (3) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (2) KRA2472 Workstation, Task Lighting and (1) Electric Outlet in Each Cabinet
 - (1) KSSKRT24SET Side Skirt Set
- Color: RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

Disclaimer
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1-562-335-0289

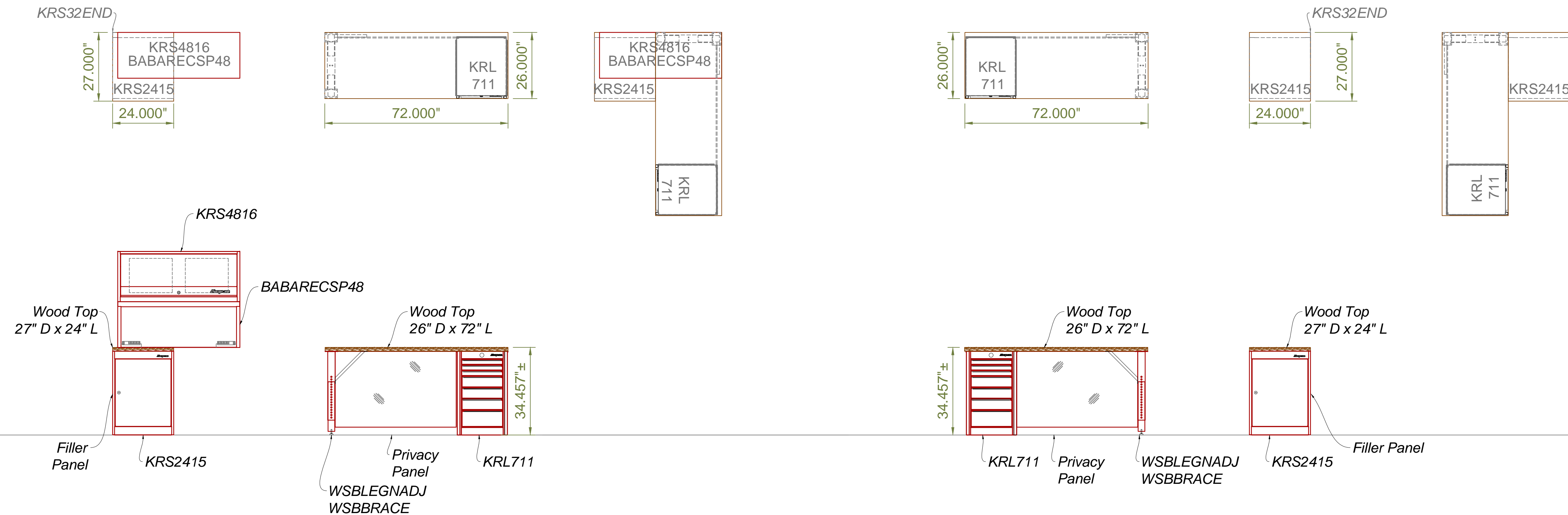
BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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DRAWING NO: BAB-4.4

APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Auto Body Office BAB 042563



BB1 = 1 Unit

- Each Unit Consists:
- (1) Wood Top 26" D x 72" L
 - (1) Wood Top 27" D x 24" L
 - (1) KRL711 Standard Drawer - No Base
 - (1) KRS24215 Bulk Cabinet - No Base
 - (1) Custom Privacy Panel
 - (1) BABARECSP48 Riser, Task Lighting, Outlets
 - (1) KRS4816 Overhead Cabinet
 - (1) WSBLEGNADJ Adjustable Leg
 - (1) WSBBRACE 18" Leg Brace
- Color = RED

BB2 = 1 Unit

- Each Unit Consists:
- (1) Wood Top 26" D x 72" L
 - (1) Wood Top 27" D x 24" L
 - (1) KRL711 Standard Drawer - No Base
 - (1) KRS24215 Bulk Cabinet - No Base
 - (1) Custom Privacy Panel
 - (1) WSBLEGNADJ Adjustable Leg
 - (1) WSBBRACE 18" Leg Brace
- Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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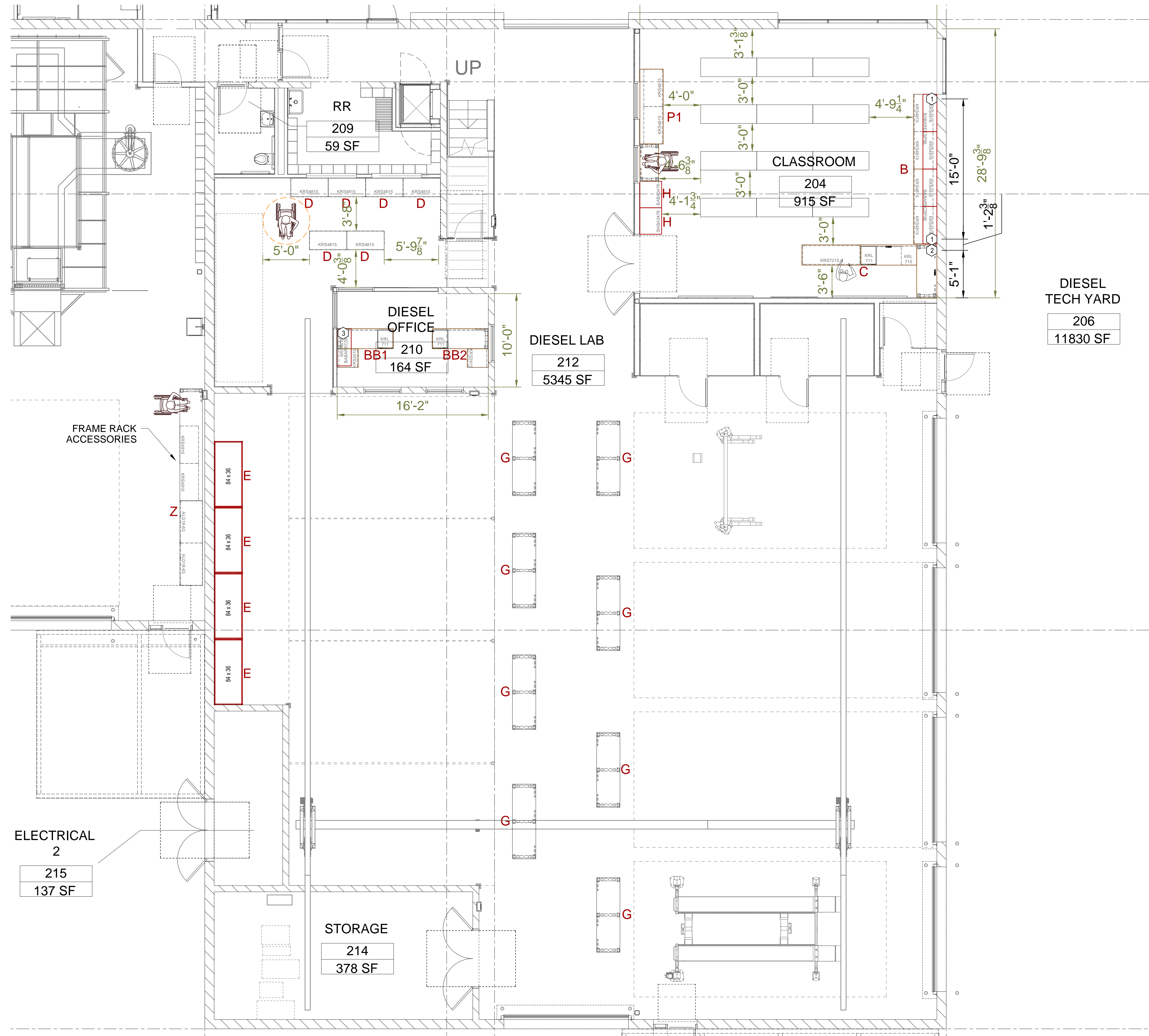
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BUILD-A-BAY EQUIPMENT PLAN
FOR
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APPENDIX 02 EQUIPMENT FURNISHINGS



DIESEL
TECH YARD
206
11830 SF



SERVICE PLAN
3/16" = 1'-0" (24" x 36")
FOR CONSTRUCTION

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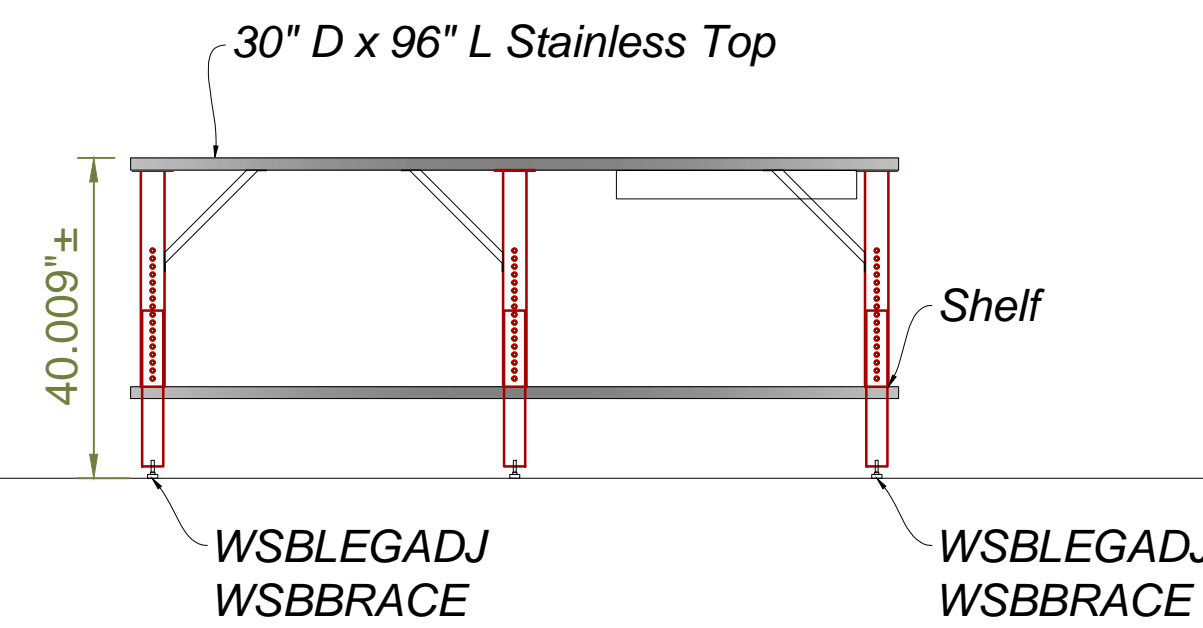
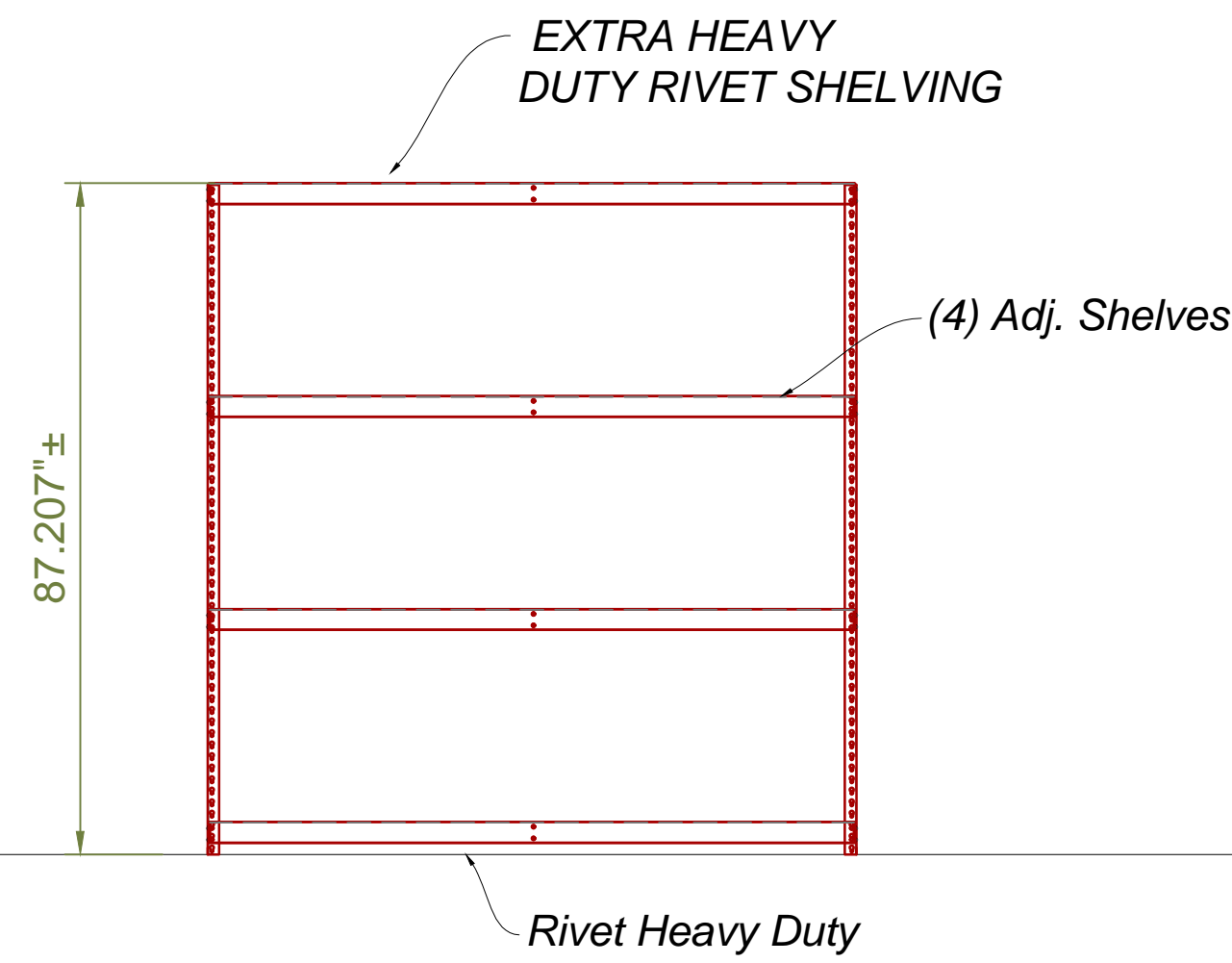
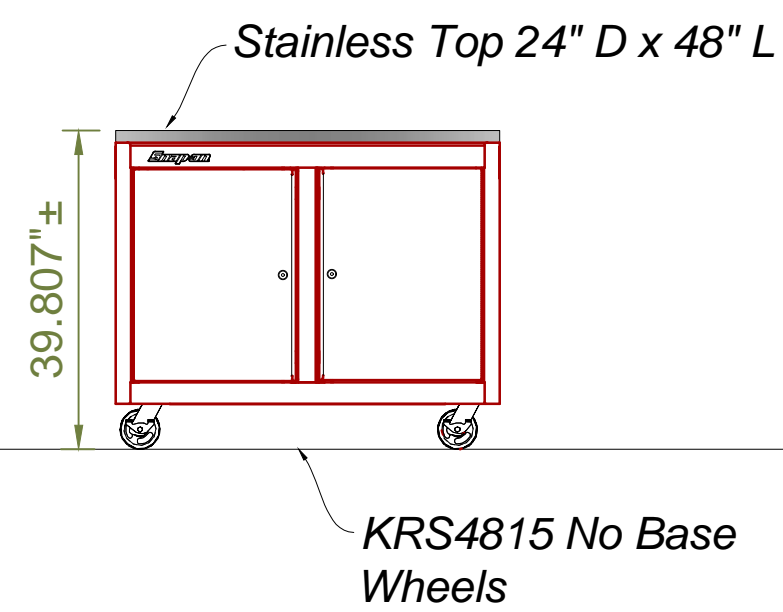
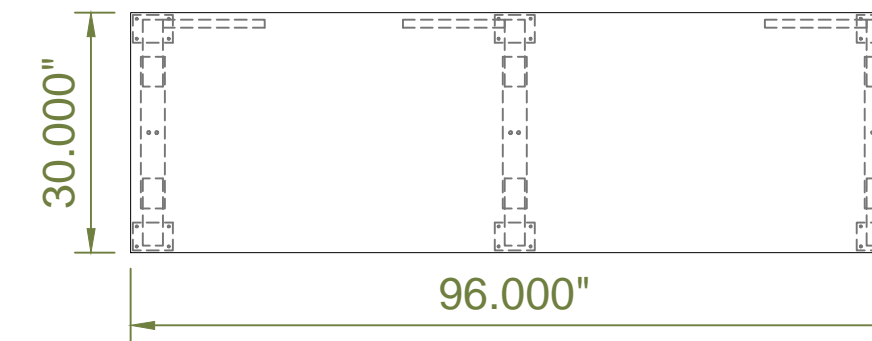
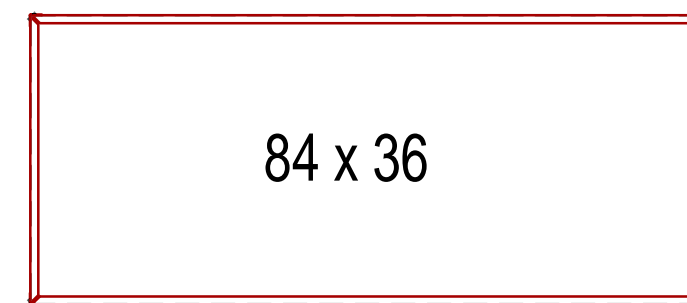
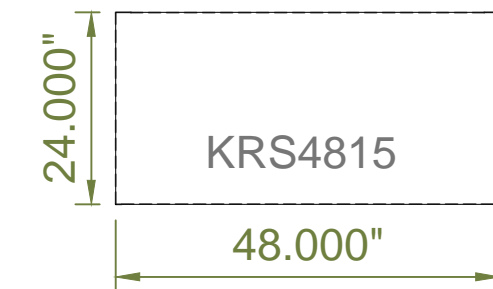
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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda
Diesel Lab 212
BAB 042563



D = 6 Units

Each Unit Consists:
(1) Stainless Top 24" D x 48" L
(1) KRS4815 Bulk Cabinet
Lockable Wheels
Color: RED

E = 4 Units

Each Unit Consists:
(1) Rivet Shelving
Extra Heavy Duty Rivet
84" W x 36" D x 87" T
(4) Adjustable Shelves
Open Back/Sides
Color: RED

G = 8 Units

Each Unit Consists:
(1) Stainless Top, 30" D x 96" L
(3) WSBLEGADJ Adjustable Leg
(3) WSBBRACE 18" Leg Brace
(1) Shelf
Color: RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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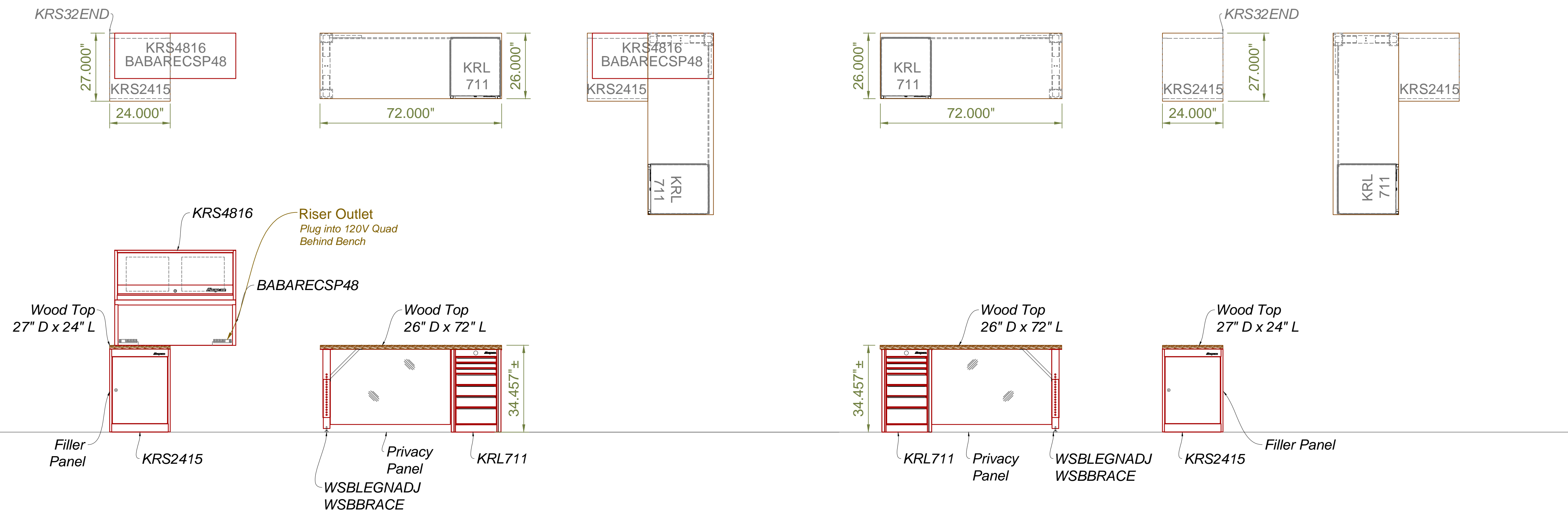
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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Diesel Office 210 BAB 042563



BB1 = 1 Unit

Each Unit Consists:

- (1) Wood Top 26" D x 72" L
 - (1) Wood Top 27" D x 24" L
 - (1) KRL711 Standard Drawer - No Base
 - (1) KRS24215 Bulk Cabinet - No Base
 - (1) Custom Privacy Panel
 - (1) BABARECSP48 Riser, Task Lighting, Outlets
 - (1) KRS4816 Overhead Cabinet
 - (1) WSBLEGNADJ Adjustable Leg
 - (1) WSBBRACE 18" Leg Brace
- Color = RED

BB2 = 1 Unit

Each Unit Consists:

- (1) Wood Top 26" D x 72" L
 - (1) Wood Top 27" D x 24" L
 - (1) KRL711 Standard Drawer - No Base
 - (1) KRS24215 Bulk Cabinet - No Base
 - (1) Custom Privacy Panel
 - (1) WSBLEGNADJ Adjustable Leg
 - (1) WSBBRACE 18" Leg Brace
- Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

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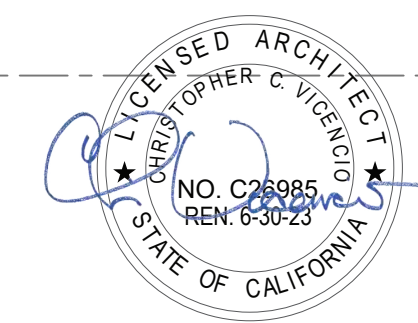
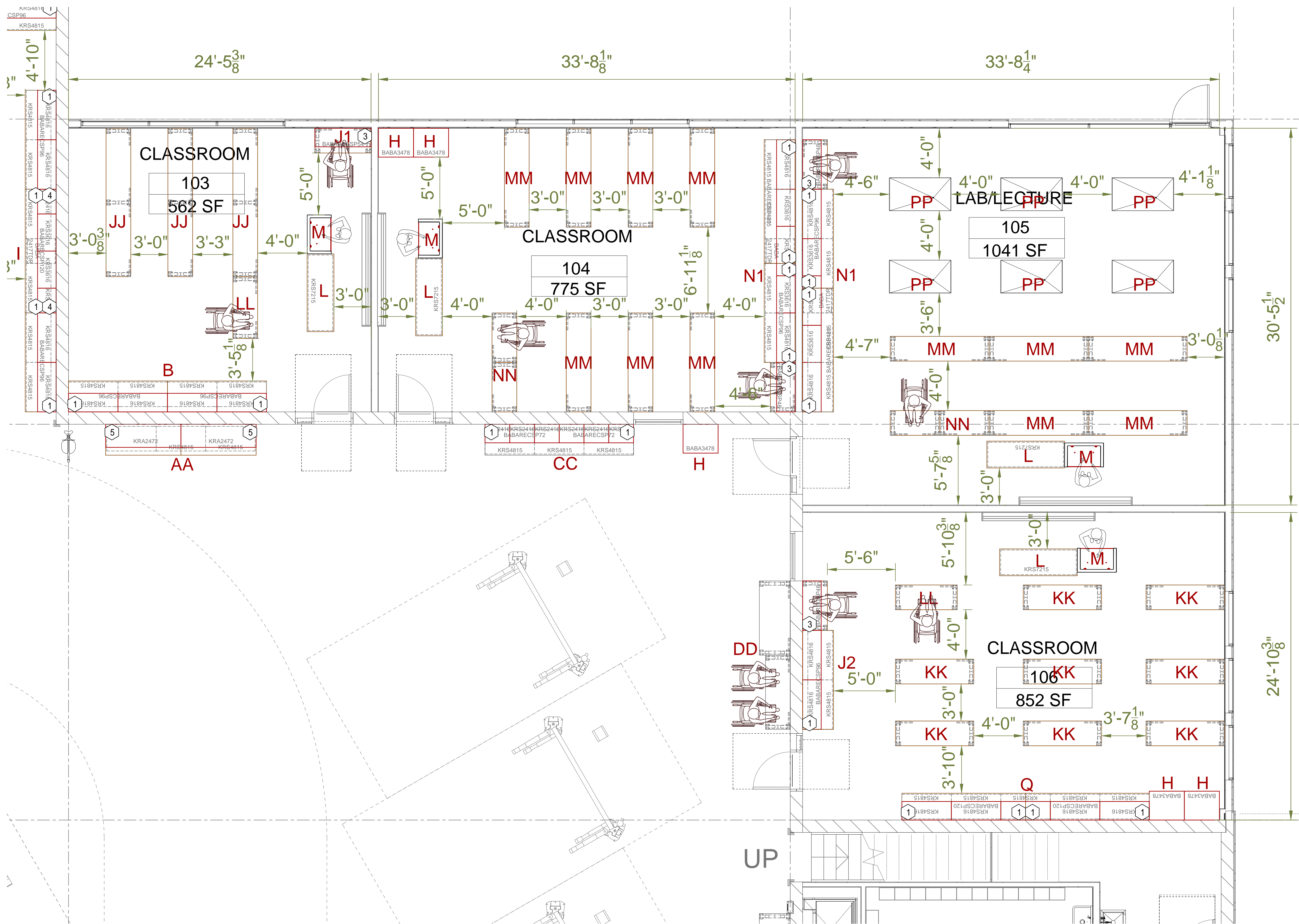
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APPENDIX 02 EQUIPMENT FURNISHINGS



SERVICE PLAN
1/4" = 1'-0" (24" x 36")

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BUILD-A-BAY EQUIPMENT PLAN
FOR
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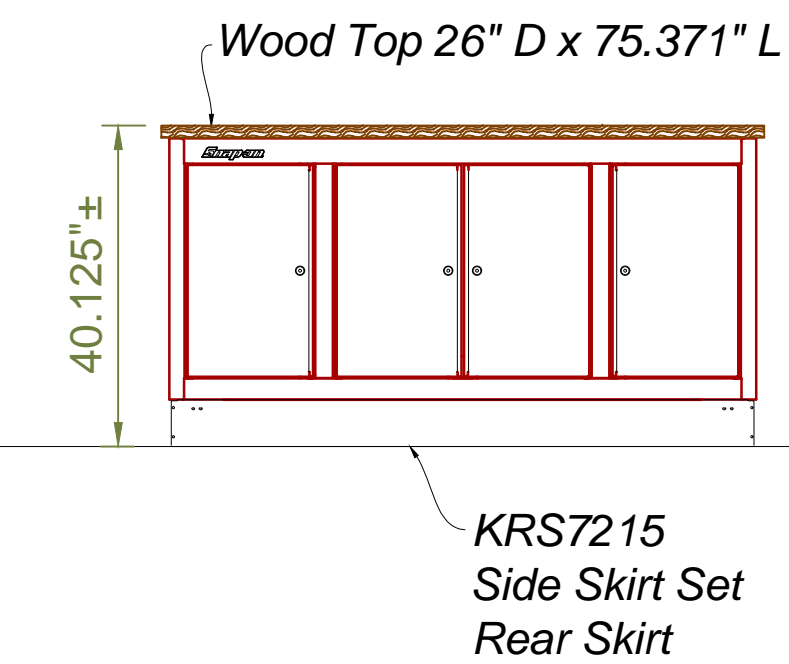
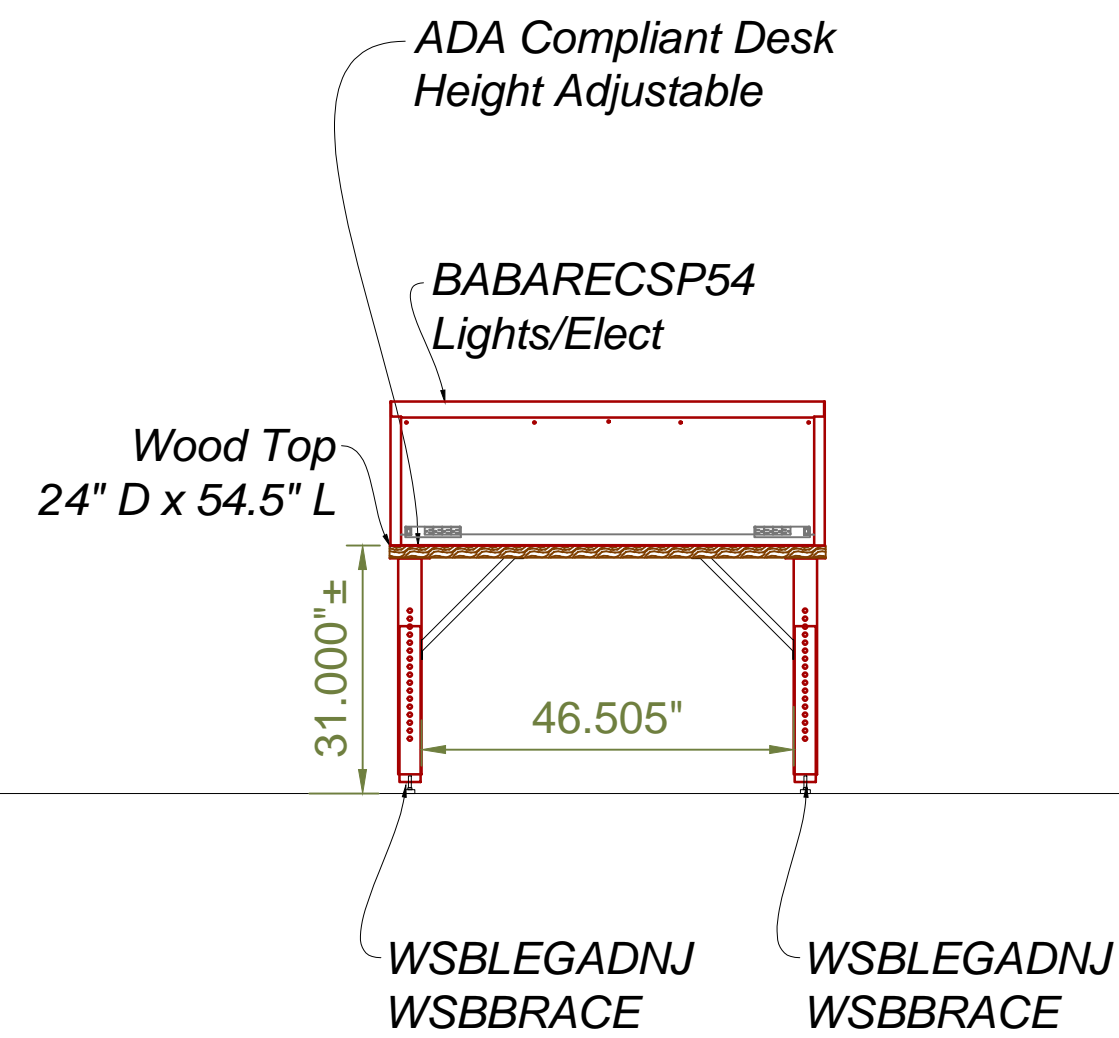
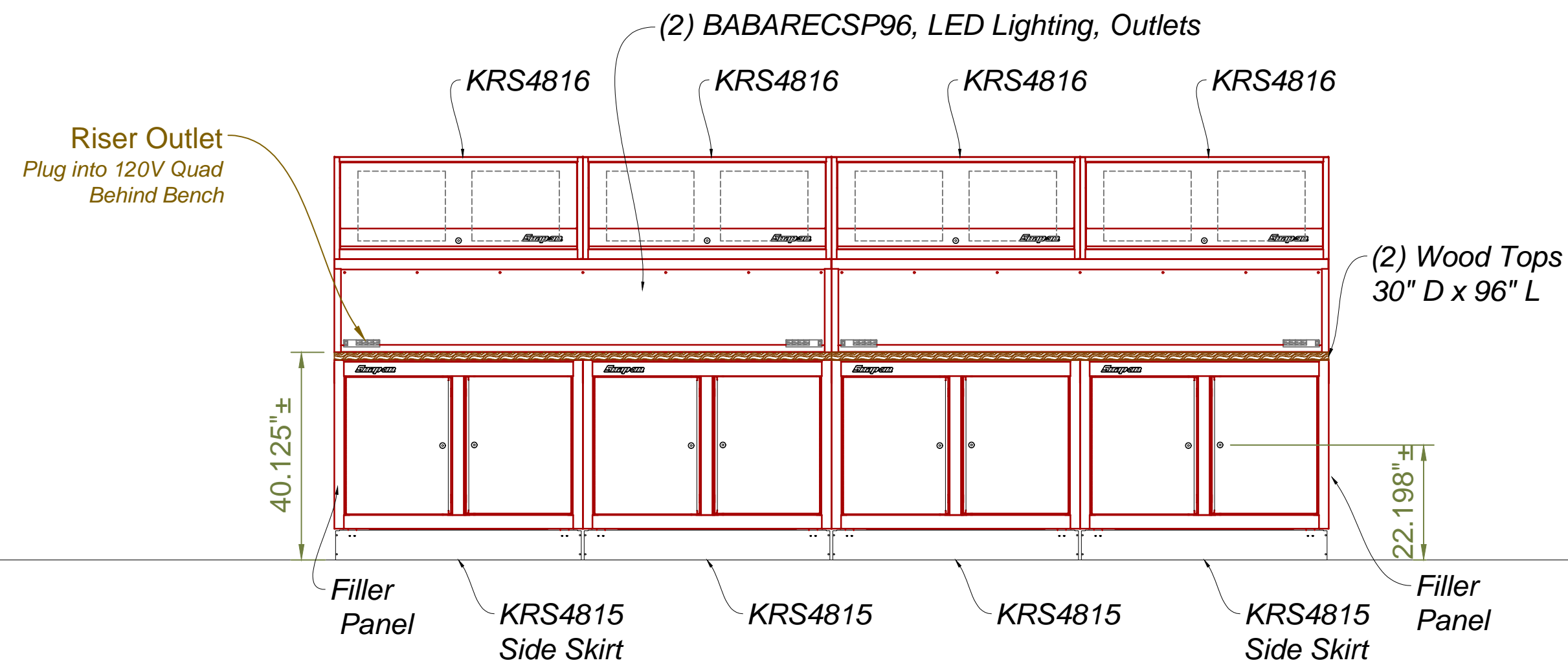
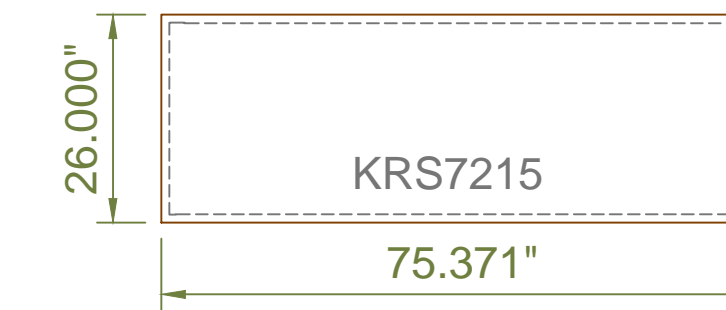
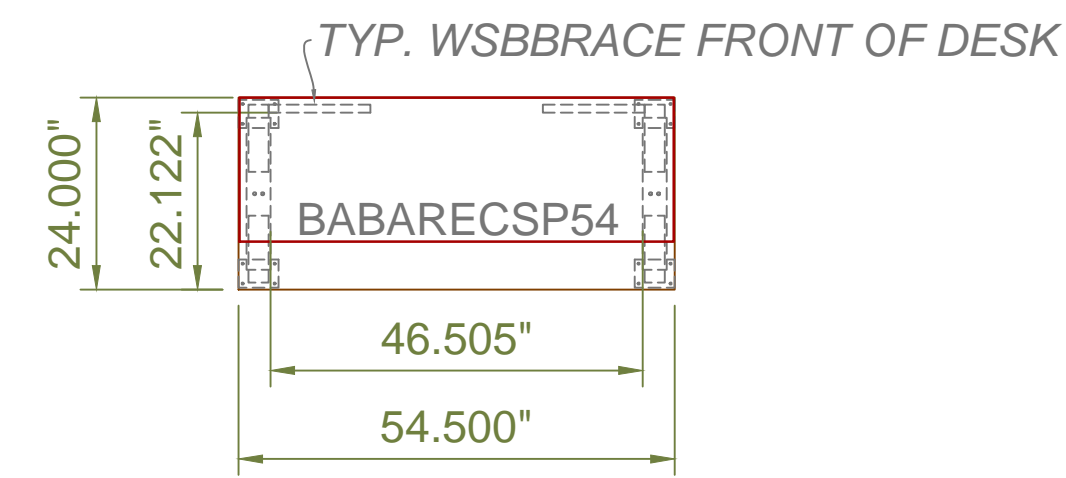
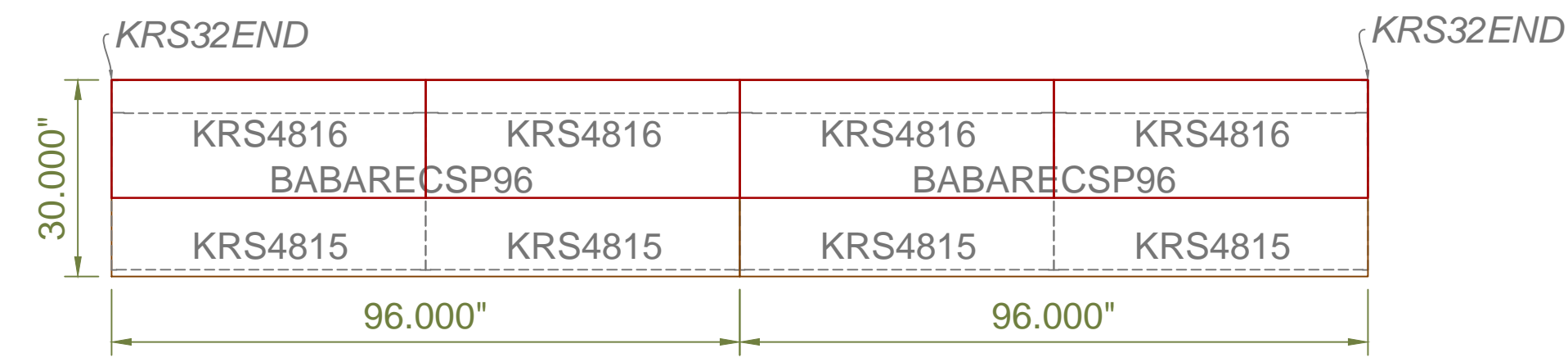
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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Automotive Classroom 103 BAB 042563



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B = 1 Unit

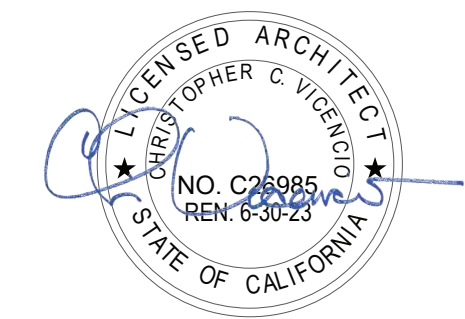
- Each Unit Consists:
- (2) Wood Tops, 30" D x 96" L
 - (4) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (2) BABARECSP96 Riser, LED Lights, Electric Outlets
 - (4) KRS4816 Overhead Cabinets
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
- Color: RED

J1 = 1 Unit

- ADA Work Station
- Each Unit Consists:
- (1) Wood Top, 24" D x 54.5" L
 - (1) BABARECSP54 Riser, LED Lights, Electric Outlets
 - (2) WSBLEGADNJ Adj. Bench Legs. ADA Compliant 28.762" H - 42.762" H
 - (2) WSBBRACE 18" Leg Brace
- Color: RED

L = 1 Unit

- Each Unit Consists:
- (1) Wood Top, 26" D x 75.371" L
 - (1) KRS7215 Bulk Cabinet
 - (1) KRSKRT24SET Side Skirt Set
 - (1) 72J0615BRPV Rear Skirt
- Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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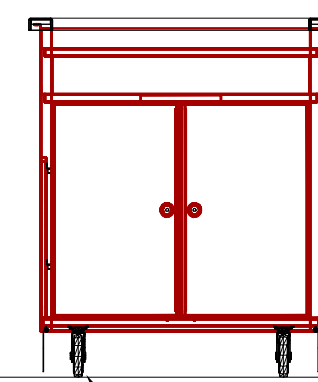
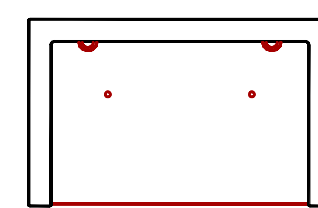
BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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APPENDIX 02 EQUIPMENT FURNISHINGS

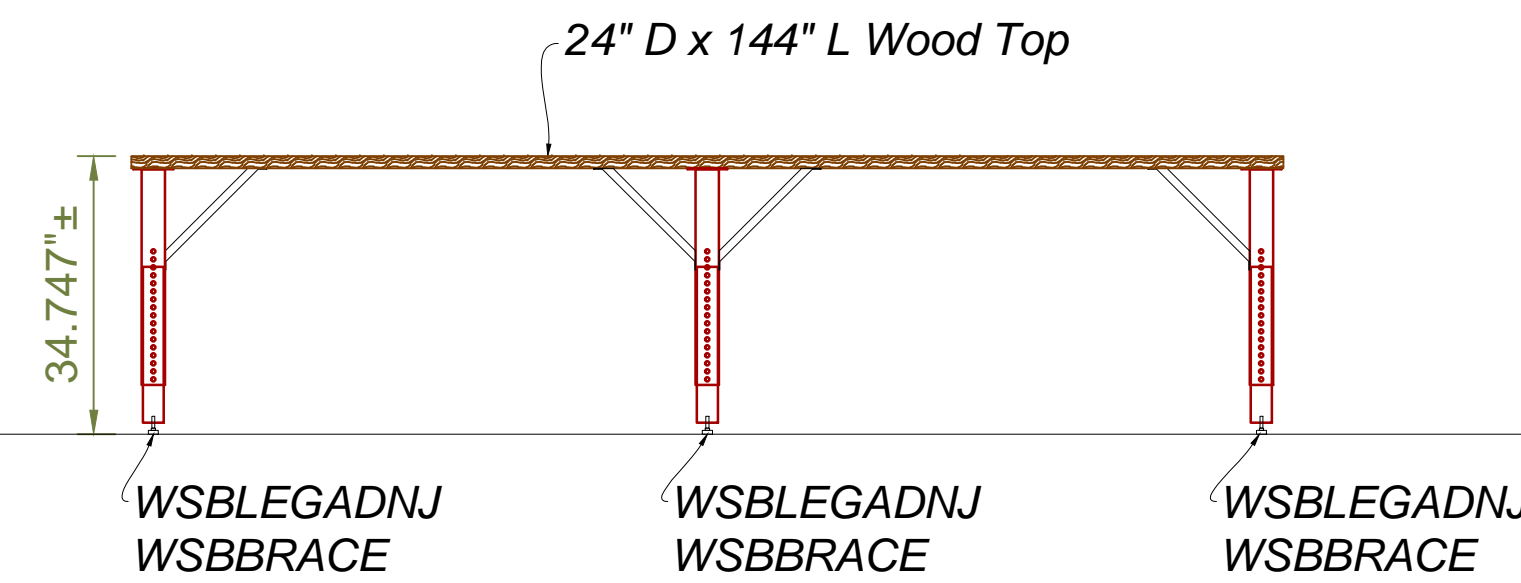
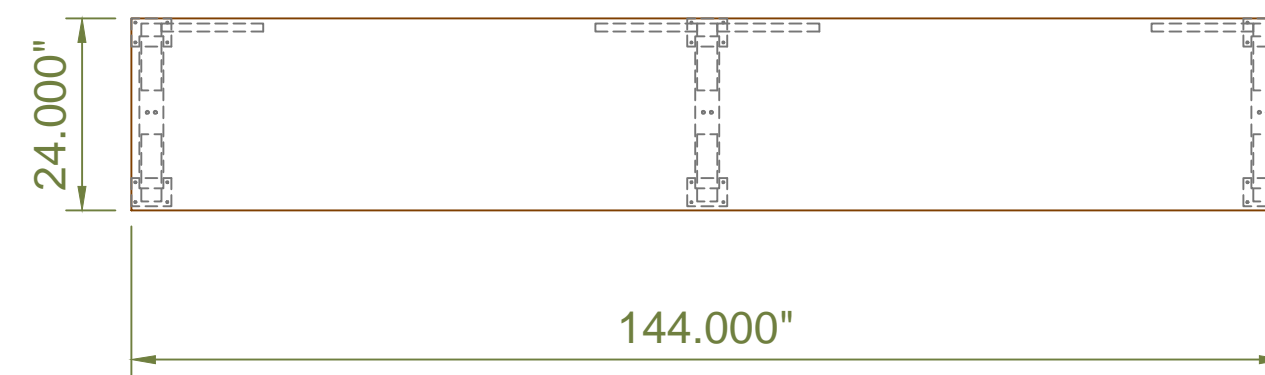
College Of Alameda
Automotive Classroom 103
BAB 042563



Podium

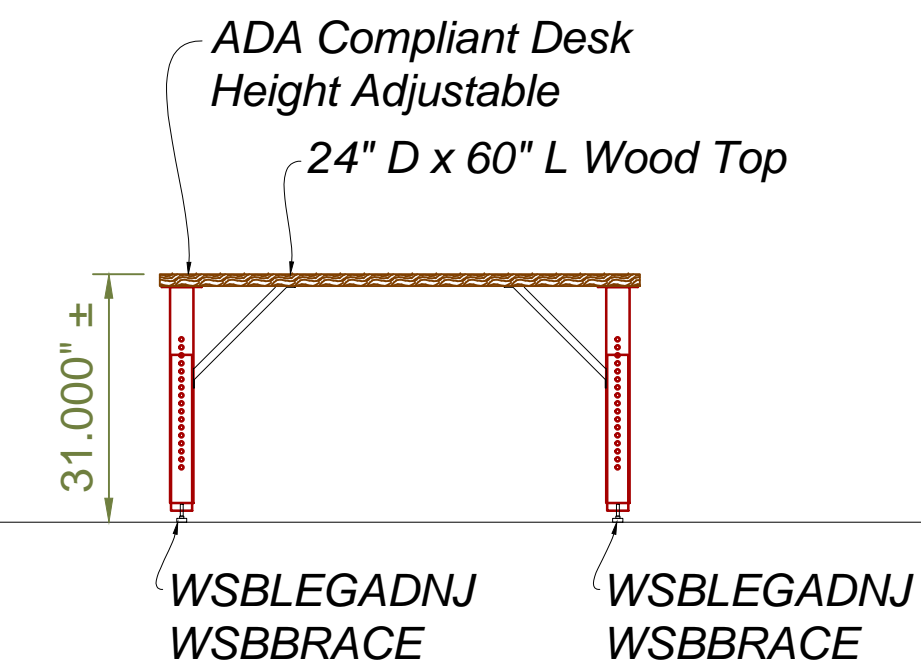
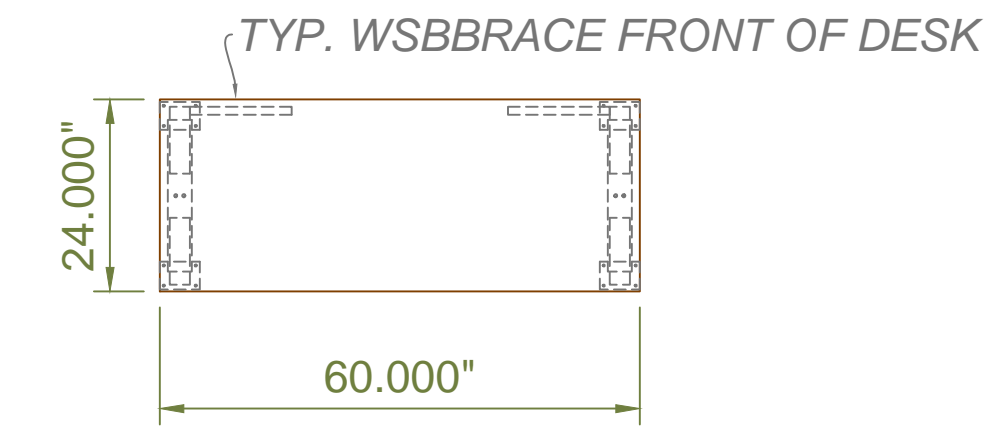
M = 1 Unit

Each Unit Consists:
(1) Podium, Mobile
Color = RED



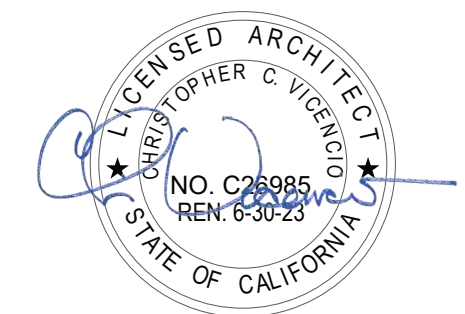
JJ = 3 Units

Each Unit Consists:
(1) 24\"/>



LL = 1 Unit

ADA Desk
Each Unit Consists:
(1) 24\"/>



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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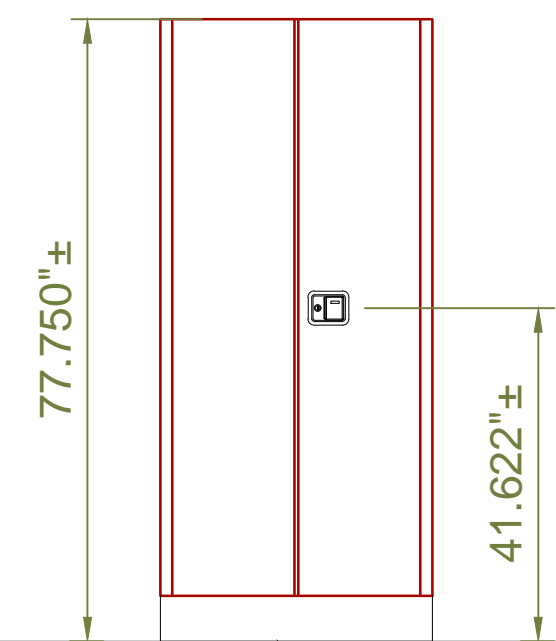
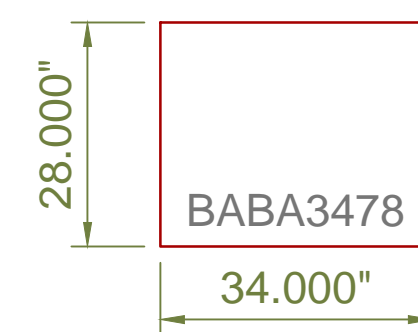
BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
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APPENDIX 02 EQUIPMENT FURNISHINGS

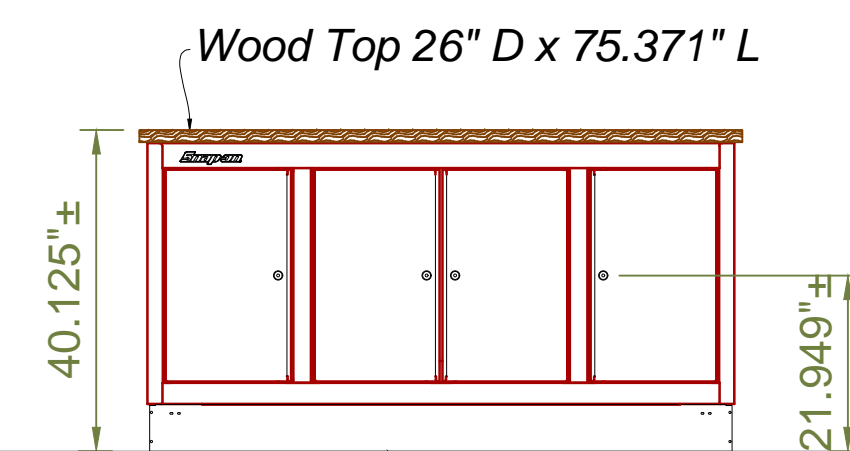
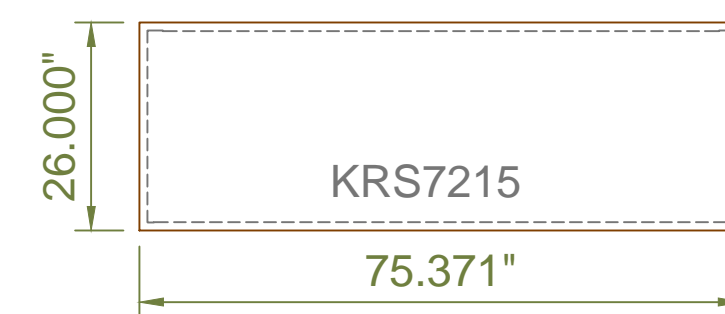
College Of Alameda Automotive Classroom 104 BAB 042563



BABA3478

H = 2 Units

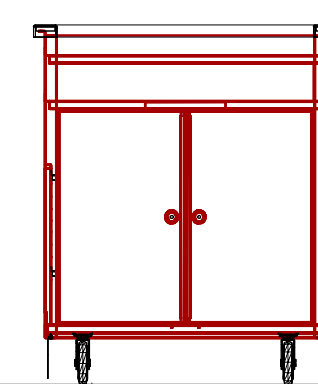
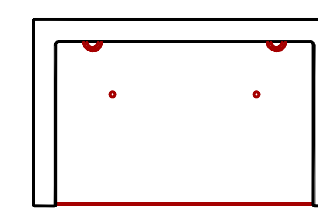
Each Unit Consists:
(1) BABA3478 Tall Cabinet
34" W x 28" D x 77.75" H
(5) Adjustable Shelves
Lockable
Color: RED



KRS7215
Side Skirt Set
Rear Skirt

L = 1 Unit

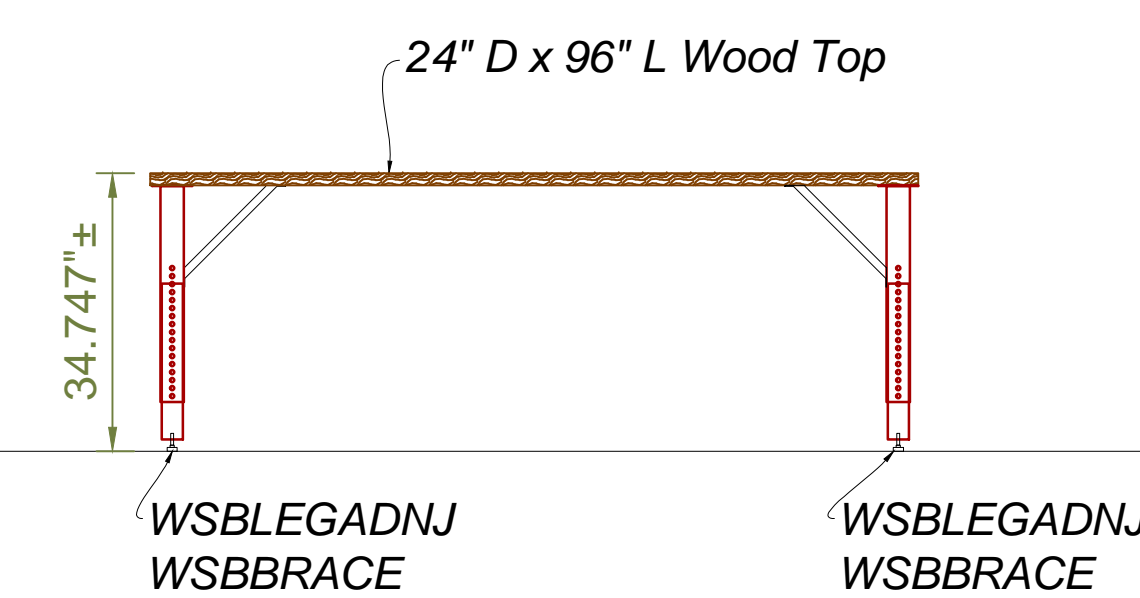
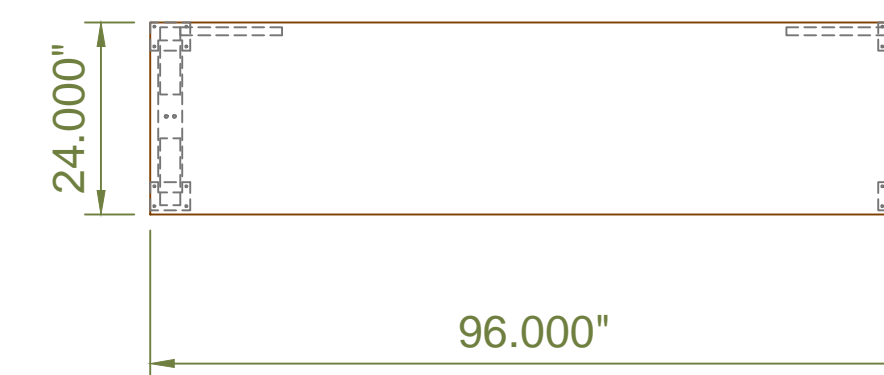
Each Unit Consists:
(1) Wood Top, 26" D x 75.371" L
(1) KRS7215 Bulk Cabinet
(1) KRSKRT24SET Side Skirt Set
(1) 72J0615BRPV Rear Skirt
Color = RED



Podium

M = 1 Unit

Each Unit Consists:
(1) Podium, Mobile
Color = RED



WSBLEGADNJ
WSBBRACE

MM = 7 Units

Each Unit Consists:
(1) 24" D x 96" L Wood Top
(2) WSBLEGADNJ Adjustable Leg
(2) WSBBRACE 18" Leg Brace
Color = RED
*4 Students Per Desk



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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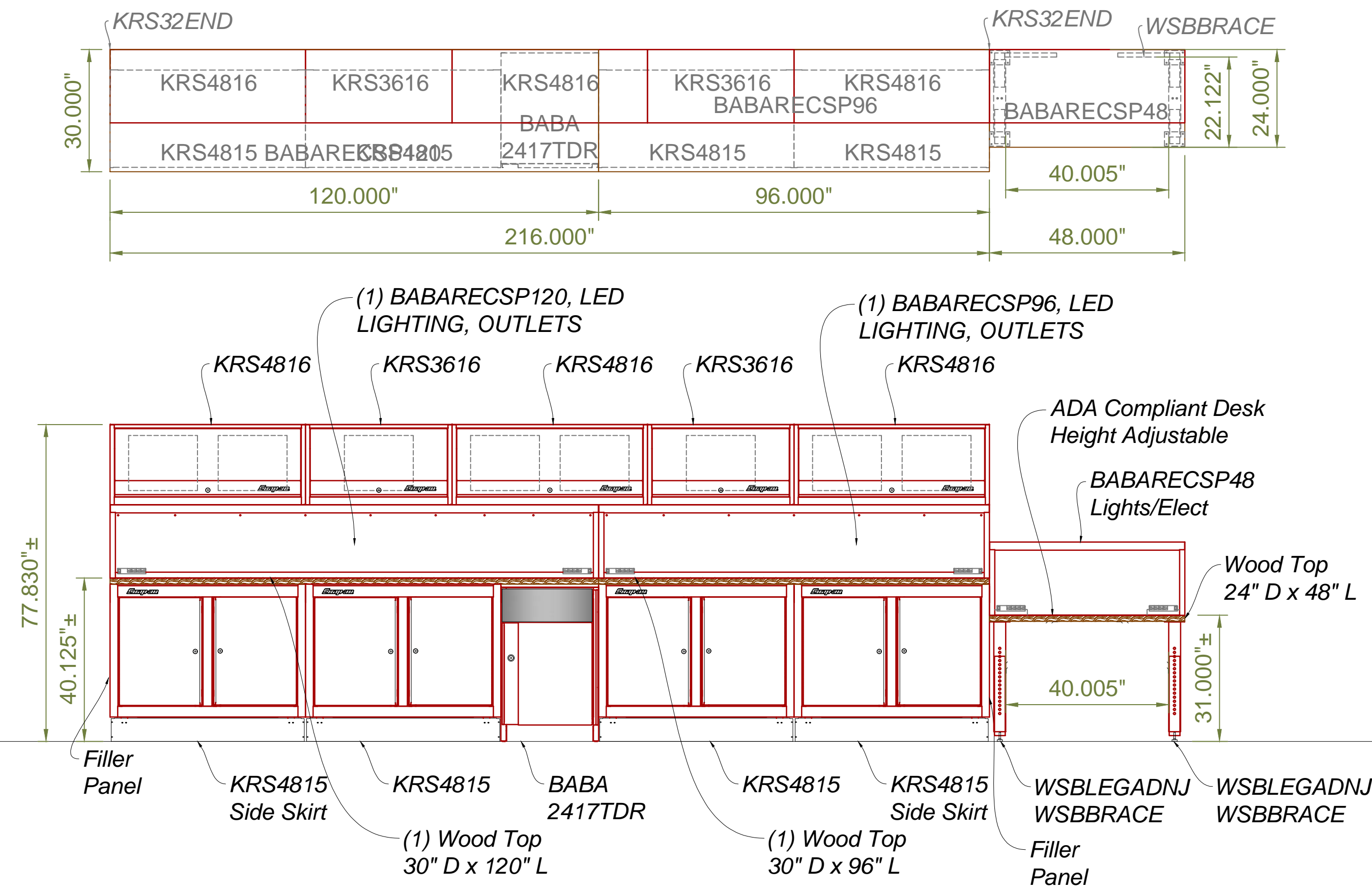
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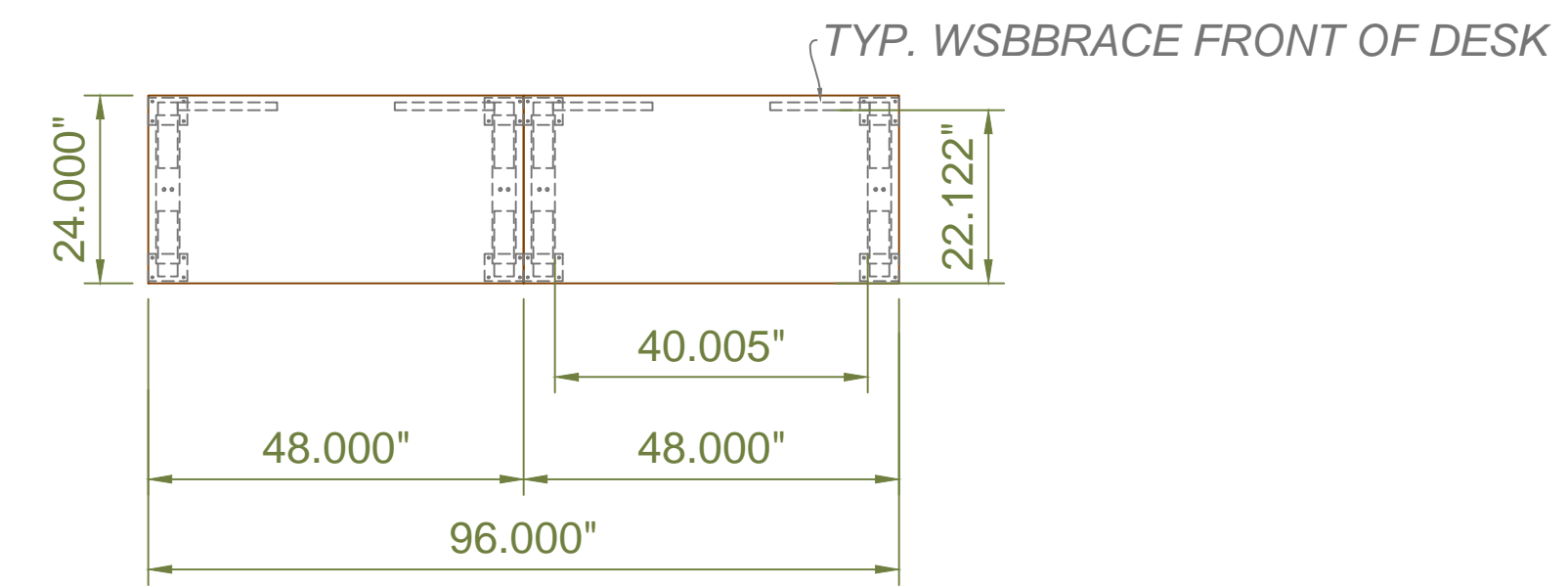
APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Automotive Classroom 104 BAB 042563



N1 = 1 Units

- ADA Work Station
Each Unit Consists:
- (1) Wood Top, 30" D x 120" L
 - (1) Wood Top, 30" D x 96" L
 - (1) Wood Top, 24" D x 48" L
 - (4) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (1) KRS2417TDR Cabinet with Trash Door and Flapper
 - (1) BABARECSP96 Riser, LED Lights, Electric Outlets
 - (1) BABARECSP120 Riser, LED Lights, Electric Outlets
 - (1) BABARECSP48 Riser, LED Lights, Electric Outlets
 - (3) KRS4816 Overhead Cabinets
 - (2) KRS3616 Overhead Cabinets
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
 - (2) WSBLEGADNJ Adj. Bench Leg - ADA Compliant 28.762" H - 42.762" H
 - (2) WSBBRACE 18" Leg Brace
- Color: RED



NN = 1 Units

- ADA Desk
Each Unit Consists:
- (2) 24" D x 48" L Wood Top
 - (4) WSBLEGADNJ Adjustable Desk Leg
 - (2) Legs are ADA Compliant
 - (4) WSBBRACE 18" Leg Brace
- Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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Regional Manager
TONY SHASHA
1-562-335-0289

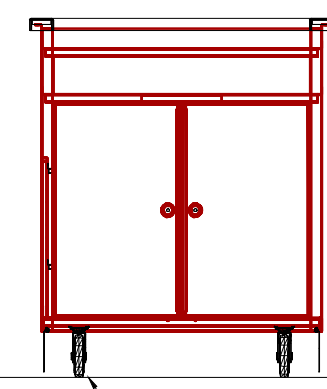
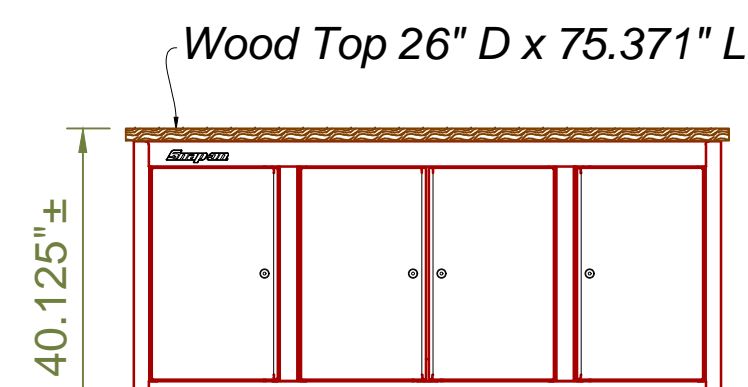
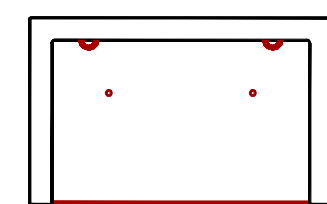
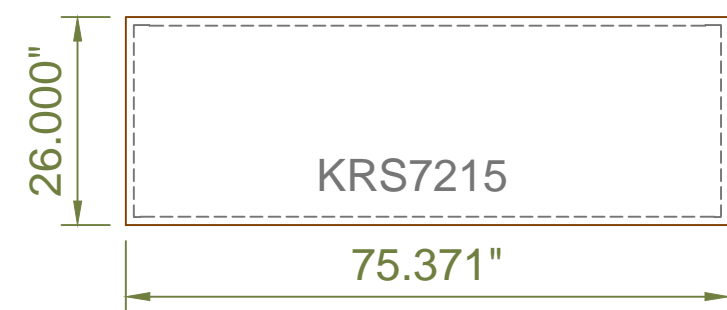
BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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SIGNATURE'S NAME: _____

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PROJECT NO: 20_80_042563
DRAWING NO: BAB-6.4

APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Automotive Lab/Lecture 105 BAB 042563

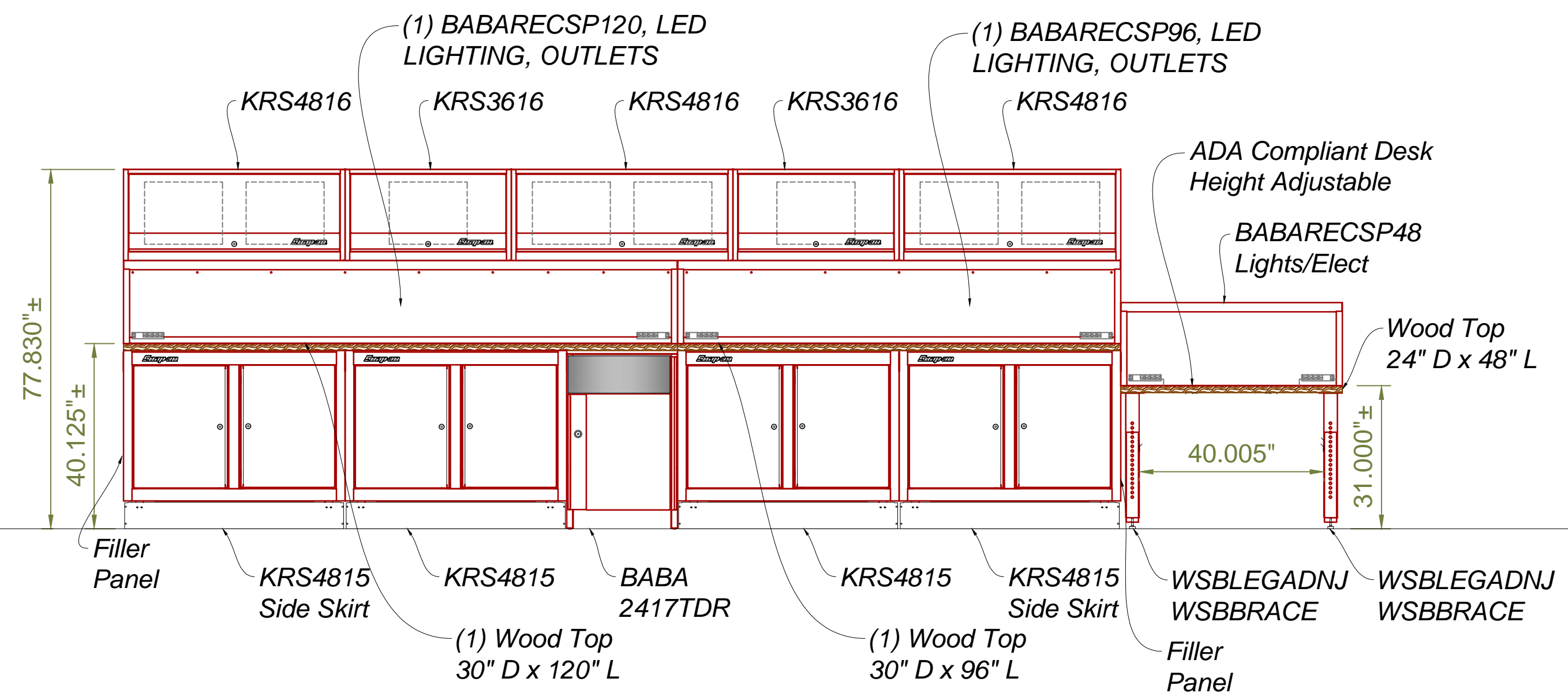
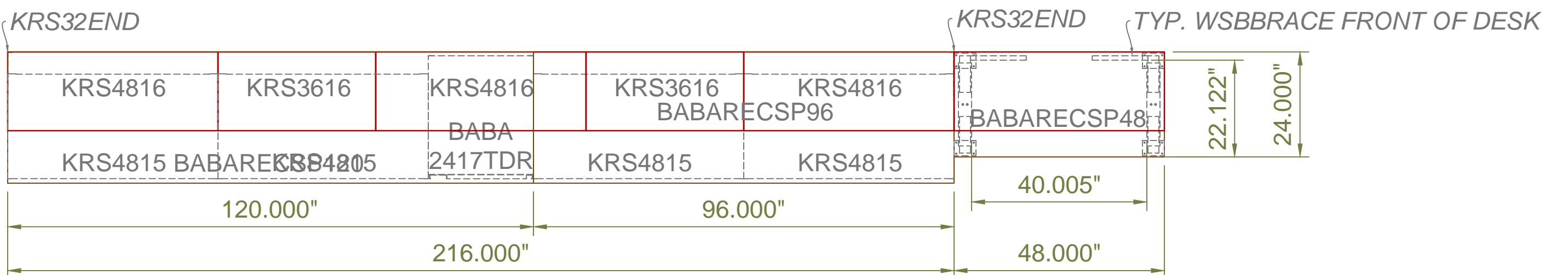


L = 1 Unit

Each Unit Consists:
 (1) Wood Top, 26" D x 75.371" L
 (1) KRS7215 Bulk Cabinet
 (1) KRKRT24SET Side Skirt Set
 (1) 72J0615BRPV Rear Skirt
 Color = RED

M = 1 Unit

Each Unit Consists:
 (1) Podium, Mobile
 Color = RED



N1 = 1 Units

ADA Work Station
 Each Unit Consists:
 (1) Wood Top, 30" D x 120" L
 (1) Wood Top, 30" D x 96" L
 (1) Wood Top, 24" D x 48" L
 (4) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 (1) KRS2417TDR Cabinet with Trash Door and Flapper
 (1) BABARECSP96 Riser, LED Lights, Electric Outlets
 (1) BABARECSP120 Riser, LED Lights, Electric Outlets
 (1) BABARECSP48 Riser, LED Lights, Electric Outlets
 (3) KRS4816 Overhead Cabinets
 (2) KRS3616 Overhead Cabinets
 (2) KRS32END Filler Panels
 (1) KRKRT24SET Side Skirt Set
 (2) WSBLEGADNJ Adj. Bench Leg - ADA Compliant
 28.762" H - 42.762" H
 (2) WSBBRACE 18" Leg Brace
 Color: RED



SERVICE PLAN
 1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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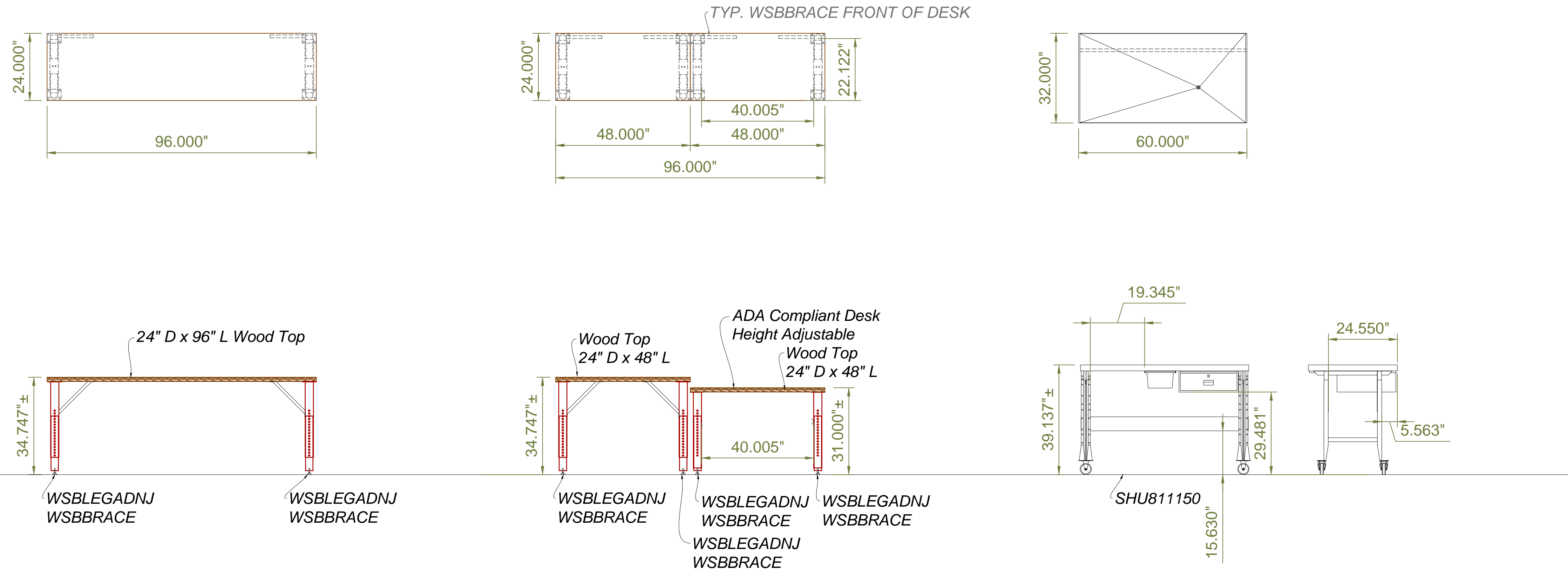
BUILD-A-BAY EQUIPMENT PLAN
 FOR
 COLLEGE OF ALAMEDA AUTOMOTIVE
 XX

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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Automotive Lab/Lecture 105 BAB 042563



MM = 5 Units

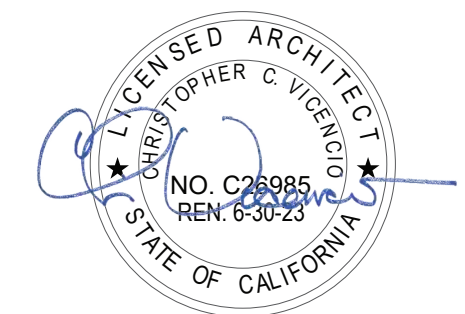
Each Unit Consists:
 (1) 24" D x 96" L Wood Top
 (2) WSBLEGADNJ Adjustable Leg
 (2) WSBBRACE 18" Leg Brace
 Color = RED
 *4 Students Per Desk

NN = 1 Units

ADA Desk
 Each Unit Consists:
 (2) 24" D x 48" L Wood Top
 (4) WSBLEGADNJ Adjustable Desk Leg
 (2) Legs are ADA Compliant
 (4) WSBBRACE 18" Leg Brace
 Color = RED

PP = 6 Units

Each Unit Consists:
 (1) SHU811150 Tear Down Bench
 32" D x 60" W x 29" - 41" H
 Adjustable Height
 Stainless Top
 Color = RED



SERVICE PLAN
 1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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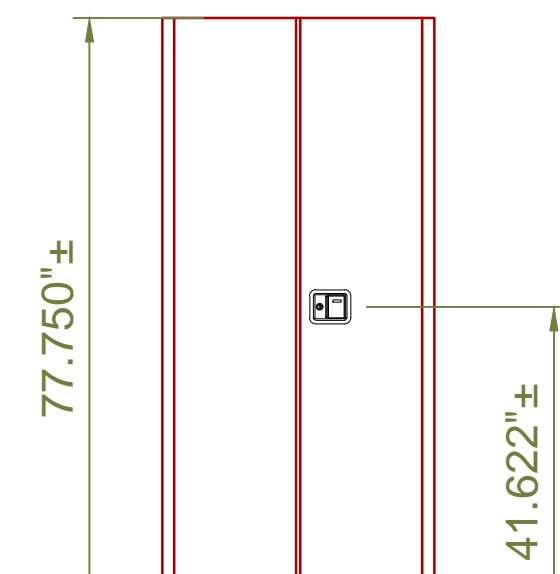
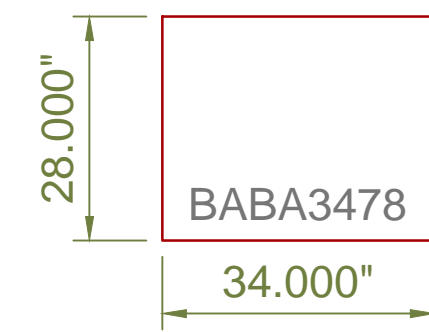
BUILD-A-BAY EQUIPMENT PLAN
 FOR
 COLLEGE OF ALAMEDA AUTOMOTIVE
 XX

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 AUTHORIZED SIGNATURE: _____
 SIGNATURE'S NAME: _____

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 PROJECT NO: 20_80_042563
 DRAWING NO: BAB-6.6

APPENDIX 02 EQUIPMENT FURNISHINGS

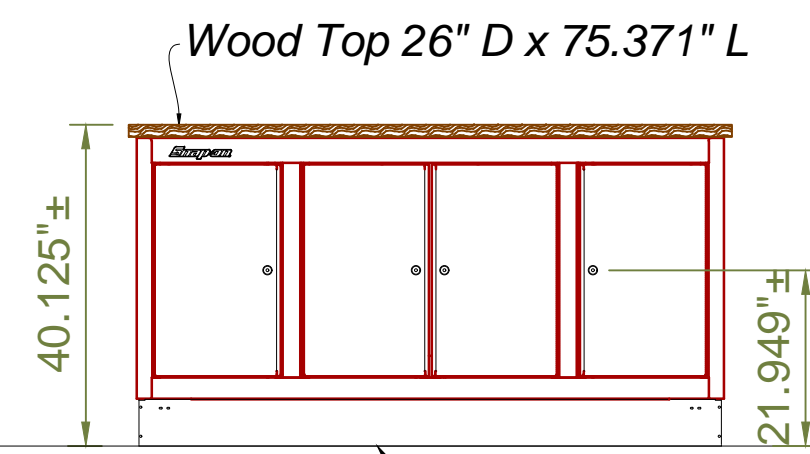
College Of Alameda Automotive Classroom 106 BAB 042563



BABA3478

H = 2 Units

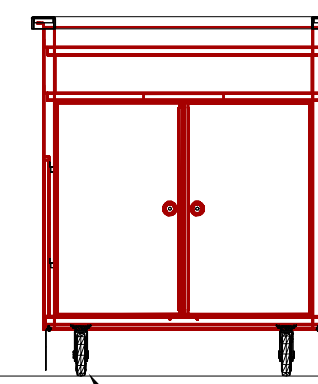
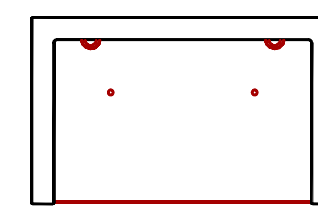
Each Unit Consists:
(1) BABA3478 Tall Cabinet
34" W x 28" D x 77.75" H
(5) Adjustable Shelves
Lockable
Color: RED



KRS7215
Side Skirt Set
Rear Skirt

L = 1 Unit

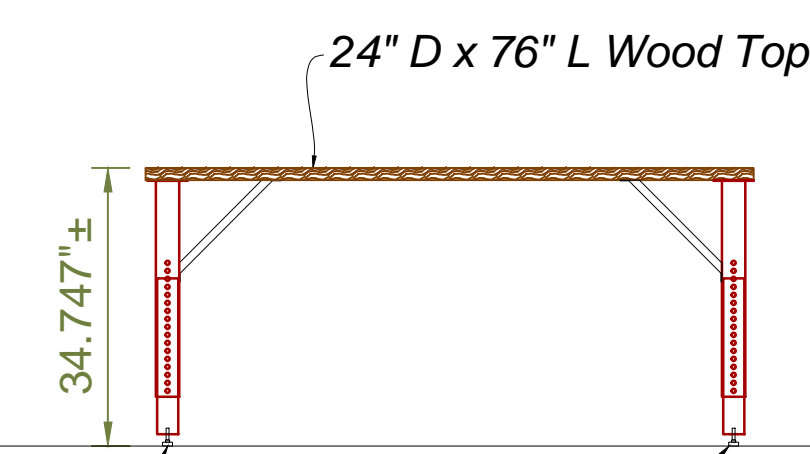
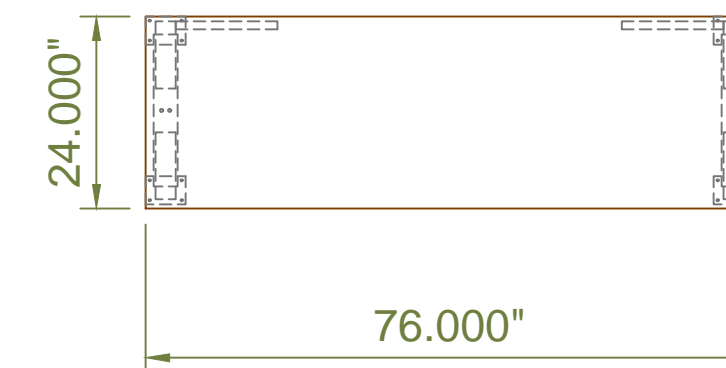
Each Unit Consists:
(1) Wood Top, 26" D x 75.371" L
(1) KRS7215 Bulk Cabinet
(1) KRKR24SET Side Skirt Set
(1) 72J0615BRPV Rear Skirt
Color = RED



Podium

M = 1 Unit

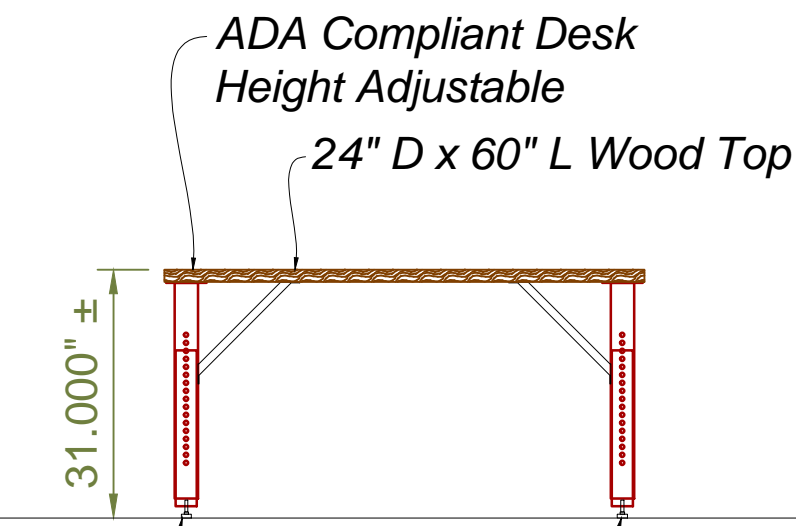
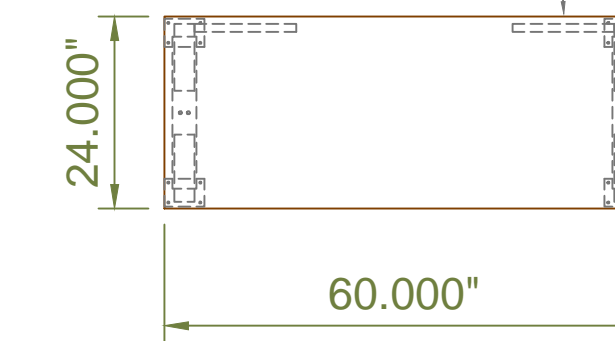
Each Unit Consists:
(1) Podium, Mobile
Color = RED



WSBLEGADNJ
WSBBRACE

KK = 8 Units

Each Unit Consists:
(1) 24" D x 76" L Wood Top
(2) WSBLEGADNJ Adjustable Leg
(2) WSBBRACE 18" Leg Brace
Color = RED
*3 Students Per Desk



WSBLEGADNJ
WSBBRACE

LL = 1 Unit

ADA Desk
Each Unit Consists:
(1) 24" D x 60" L Wood Top
(2) WSBLEGADNJ Adjustable
ADA Desk Leg
28.762" H - 42.762" H
(2) WSBBRACE 18" Leg Brace
Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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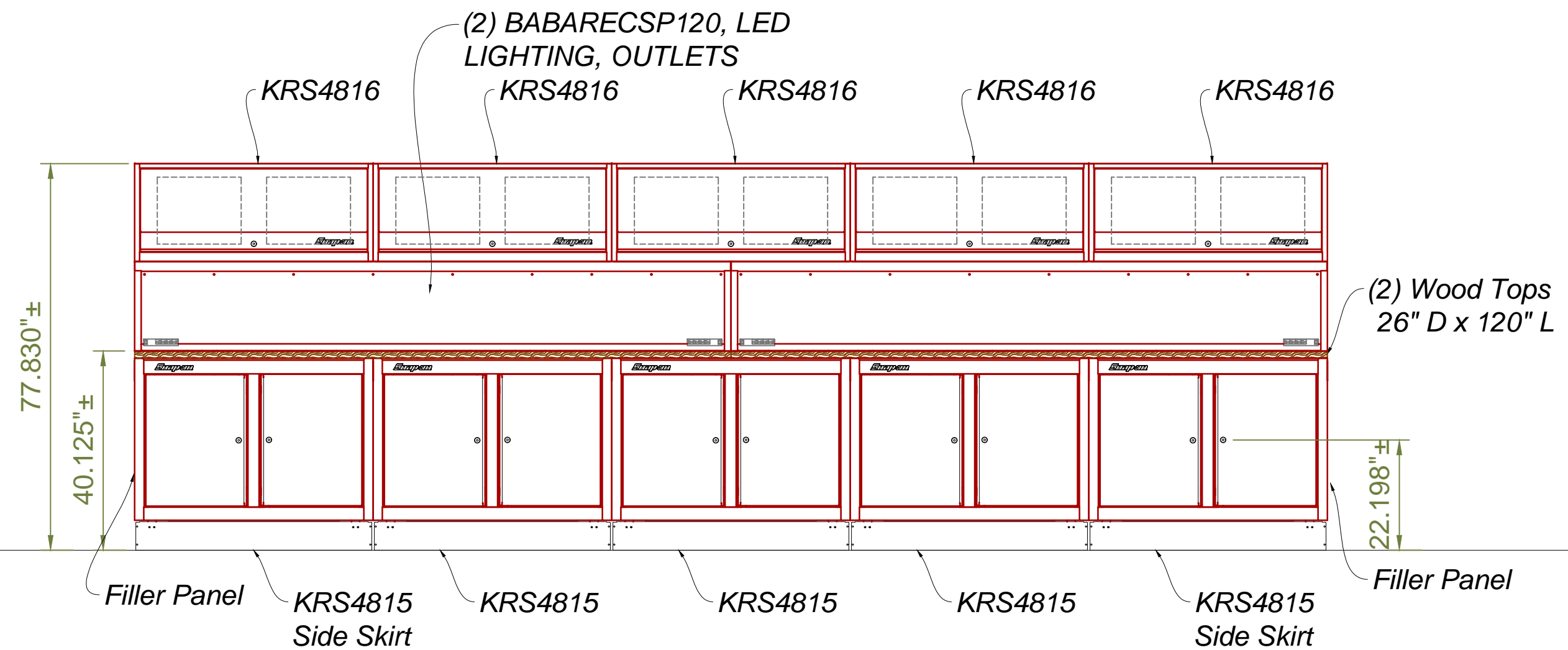
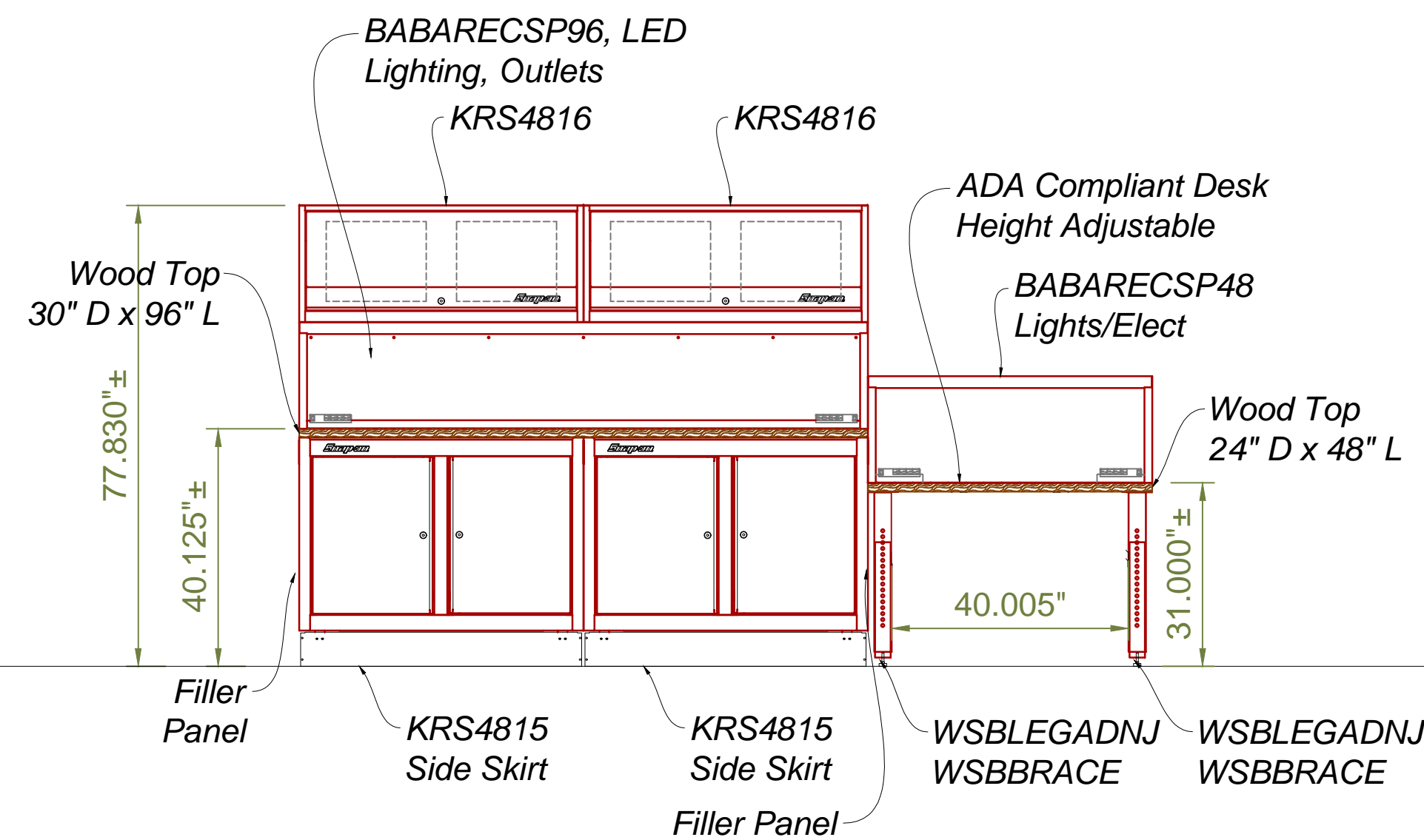
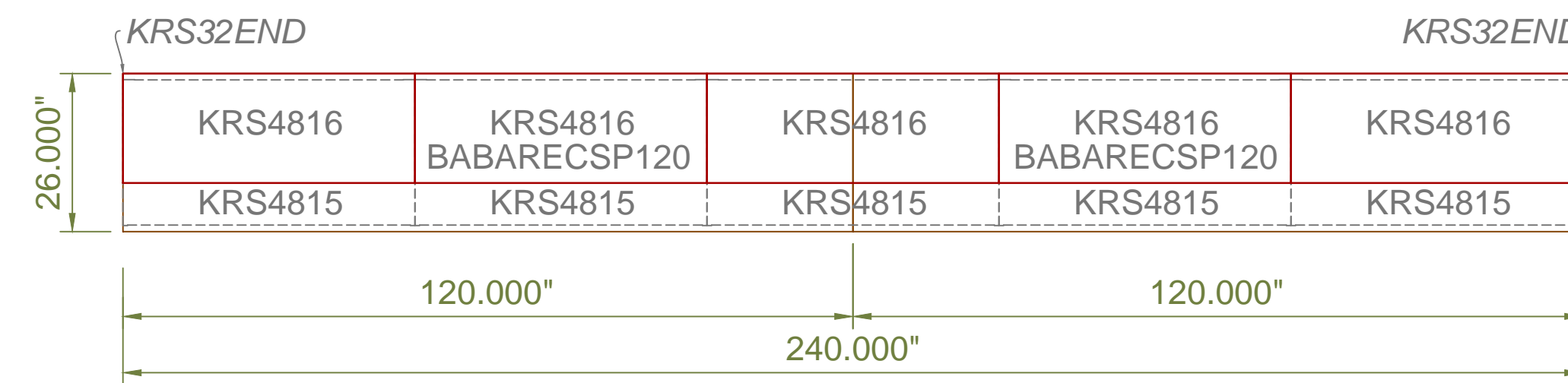
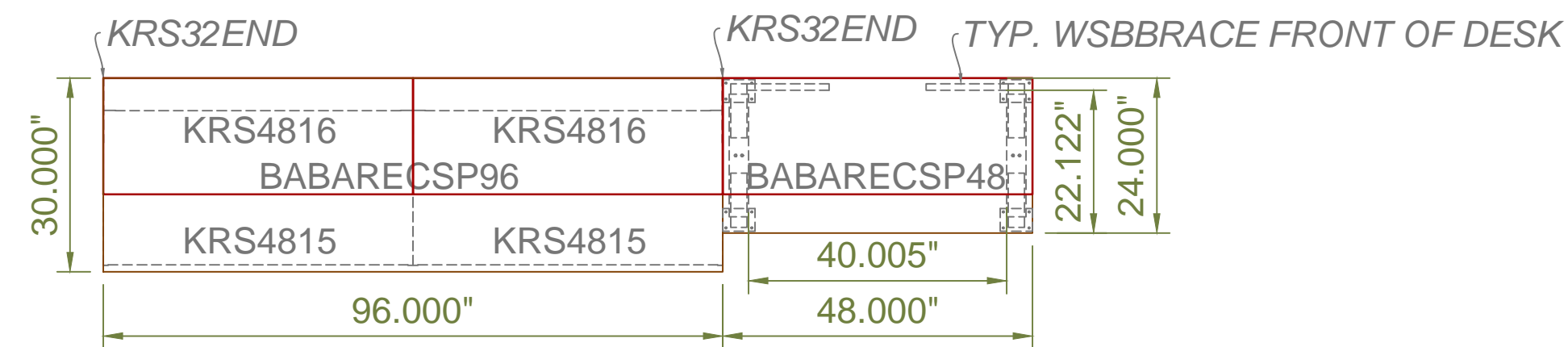
BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

DATE: _____
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DRAWING NO: BAB-6.7

APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Automotive Classroom 106 BAB 042563



J2 = 1 Unit

ADA Work Station

Each Unit Consists:

- (1) Wood Top, 30" D x 96" L
 - (1) Wood Top, 24" D x 48" L
 - (2) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (1) BABARECSP96 Riser, LED Lights, Electric Outlets
 - (1) BABARECSP48 Riser, LED Light, Electric Outlets
 - (2) KRS4816 Overhead Cabinets
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
 - (2) WSBLEGADNJ Adjustable Bench Legs.
ADA Compliant - 28.762" H - 42.762" H
 - (2) WSBBRACE 18" Leg Brace
- Color: RED

Q = 1 Unit

Each Unit Consists:

- (2) Wood Tops, 30" D x 120" L
 - (5) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (2) BABARECSP120 Riser, LED Lights, Electric
 - (5) KRS4816 Overhead Cabinets
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
- Color: RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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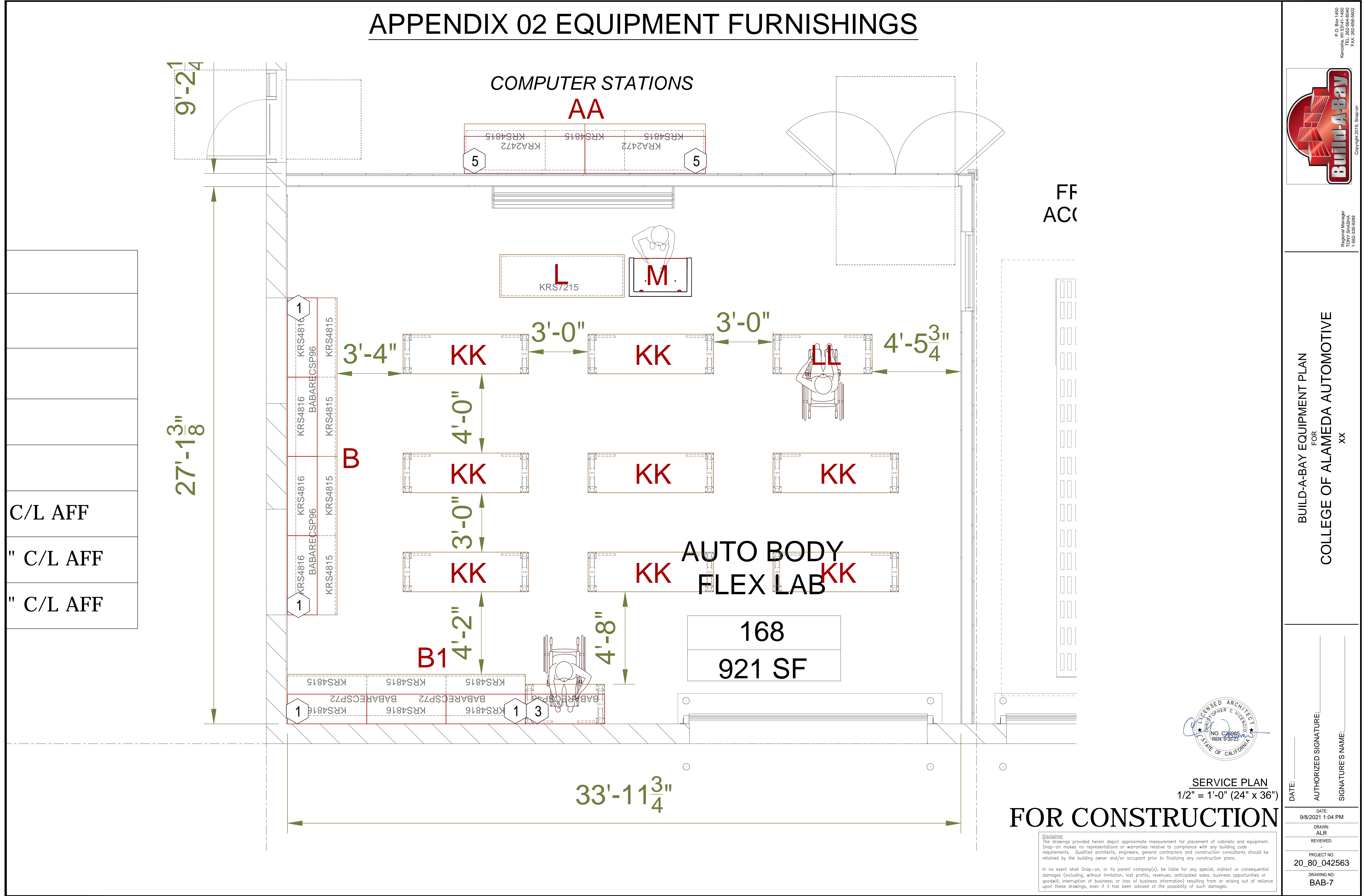
Regional Manager
TONY SHASHA
1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

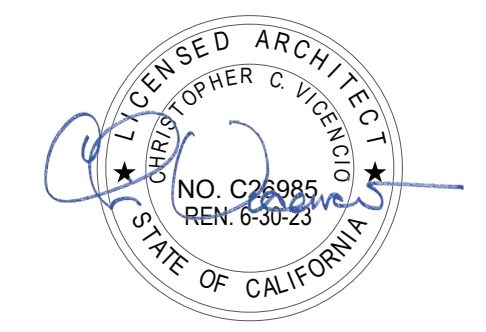
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PROJECT NO: 20_80_042563
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APPENDIX 02 EQUIPMENT FURNISHINGS



C/L AFF
 " C/L AFF
 " C/L AFF



SERVICE PLAN
 1/2" = 1'-0" (24" x 36")

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Build-A-Bay
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 TONY SHASHA
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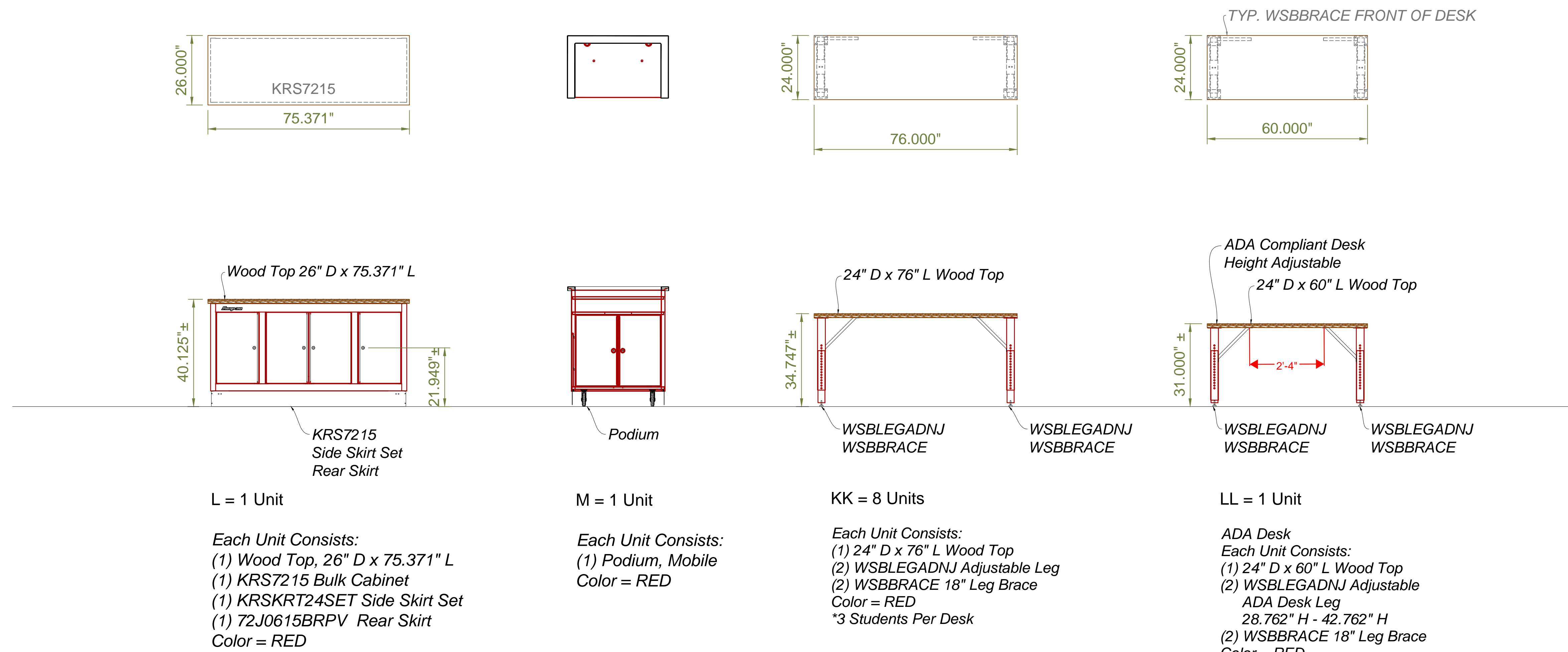
BUILD-A-BAY EQUIPMENT PLAN FOR COLLEGE OF ALAMEDA AUTOMOTIVE
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DATE: _____
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 DRAWING NO: BAB-7

APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Auto Body Flex Lab 168 BAB 042563



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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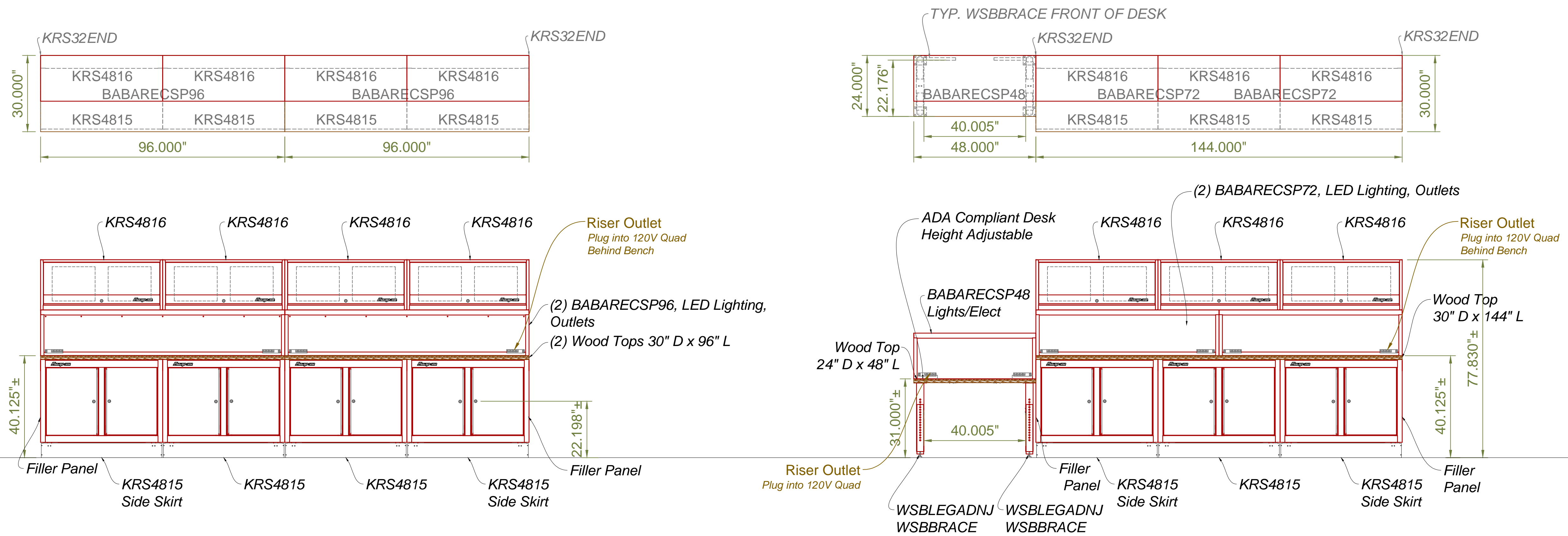
BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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AUTHORIZED SIGNATURE: _____
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PROJECT NO: 20_80_042563
DRAWING NO: BAB-7.1

APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Auto Body Flex Lab 168 BAB 042563



B = 1 Unit

- Each Unit Consists:
- (2) Wood Tops, 30" D x 96" L
 - (4) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (2) BABARECSP96 Riser, LED Lights, Electric Outlets
 - (4) KRS4816 Overhead Cabinets
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
- Color: RED

B1 = 1 Unit

- Each Unit Consists:
- (1) Wood Top, 30" D x 144" L
 - (1) Wood Top, 24" D x 48" L
 - (3) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (2) BABARECSP72 Riser, LED Lights, Electric Outlets
 - (1) BABARECSP48 Riser, LED Lights, Electric Outlets
 - (3) KRS4816 Overhead Cabinets
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
 - (2) WSBLEGADNJ Adjustable Bench Legs - ADA Compliant
28.762" H - 42.762" H
 - (2) WSBBRACE 18" Leg Brace
- Color: RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

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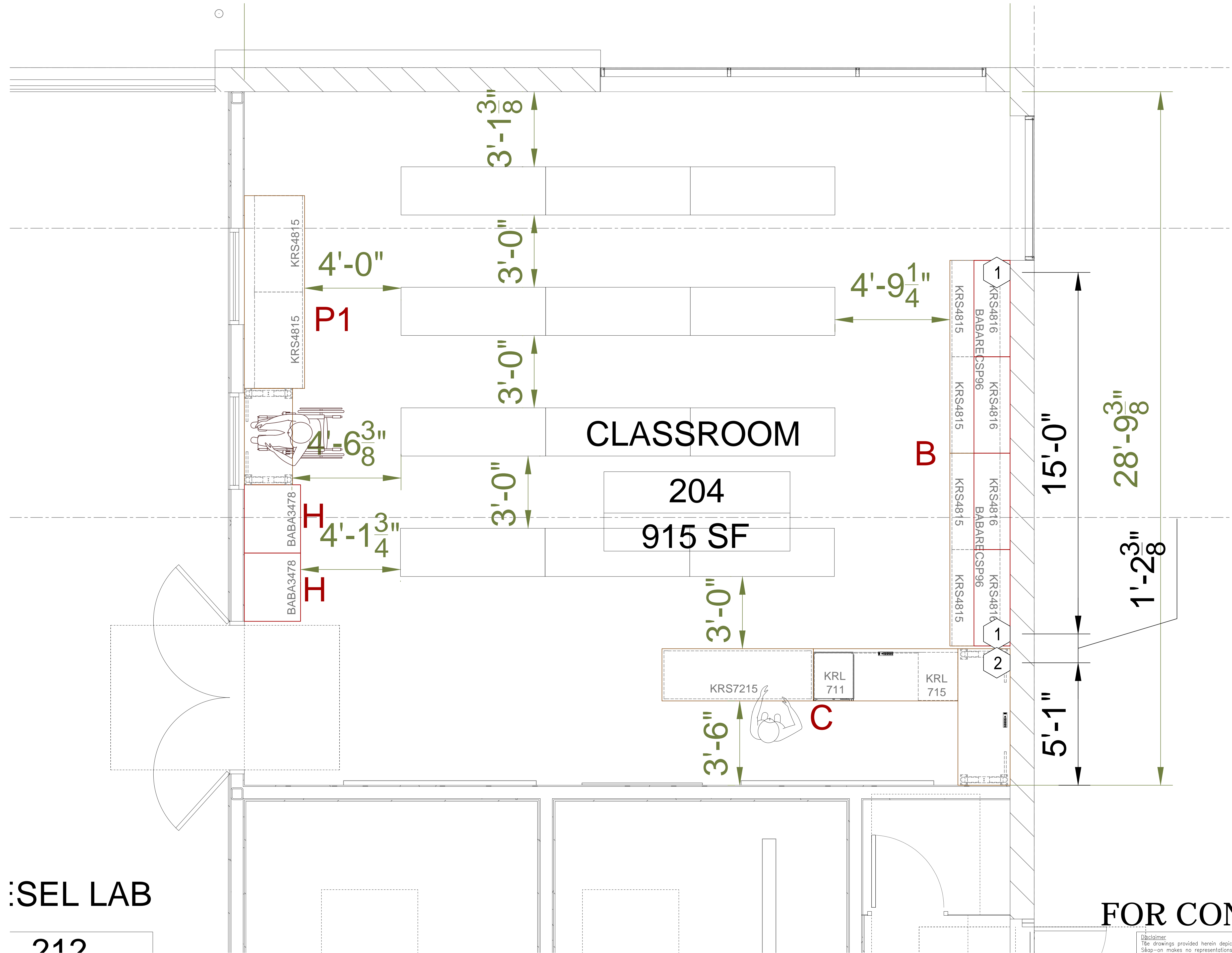
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BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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 DRAWING NO: BAB-7.2

APPENDIX 02 EQUIPMENT FURNISHINGS



SEL LAB

212

CLASSROOM

204
915 SF



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

DATE: _____
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SIGNATURE'S NAME: _____

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PROJECT NO: 20_80_042563
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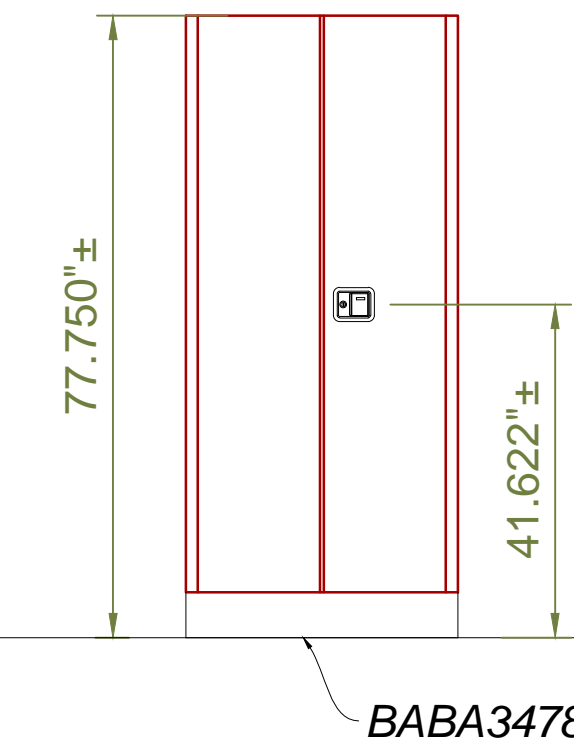
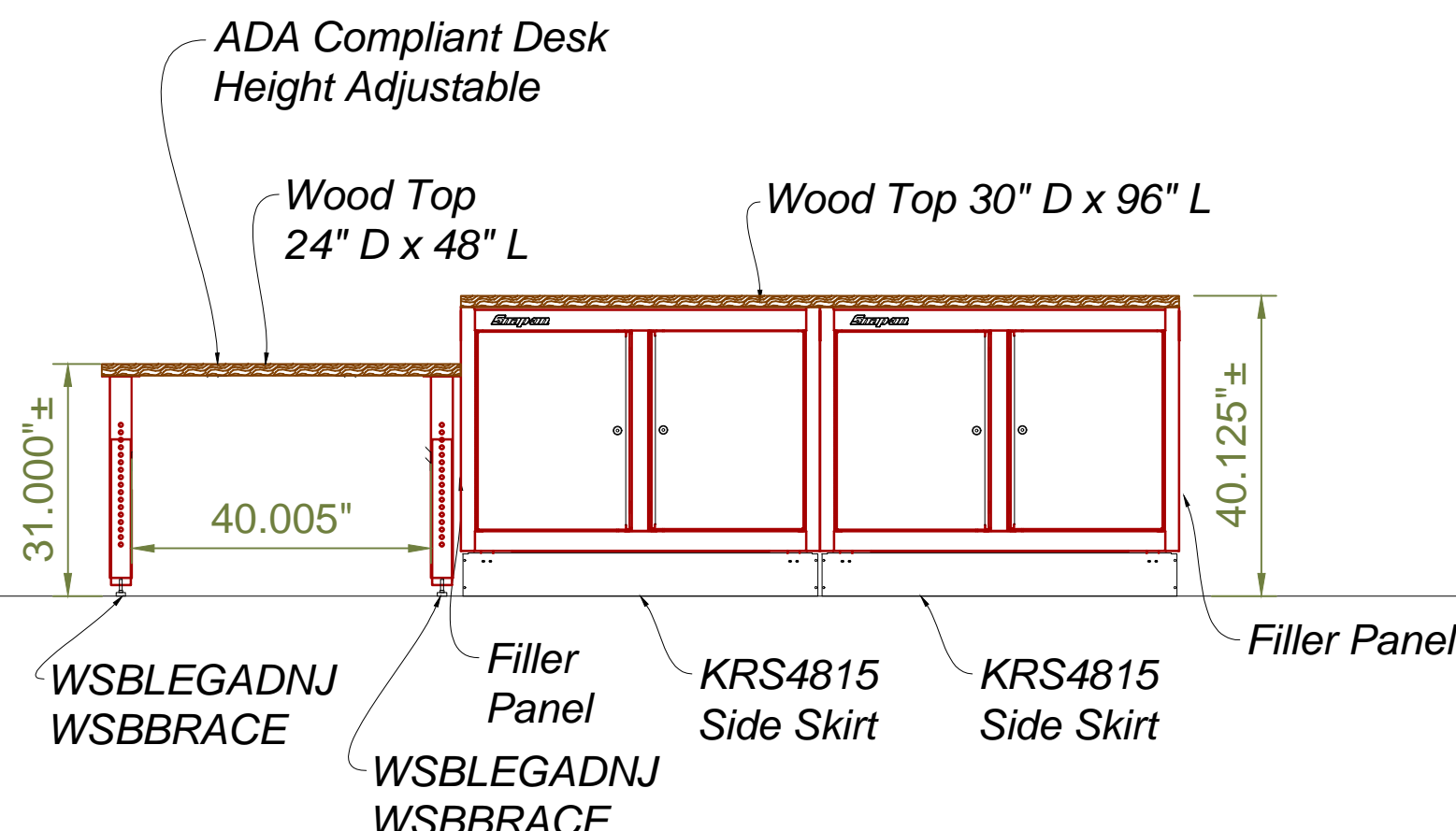
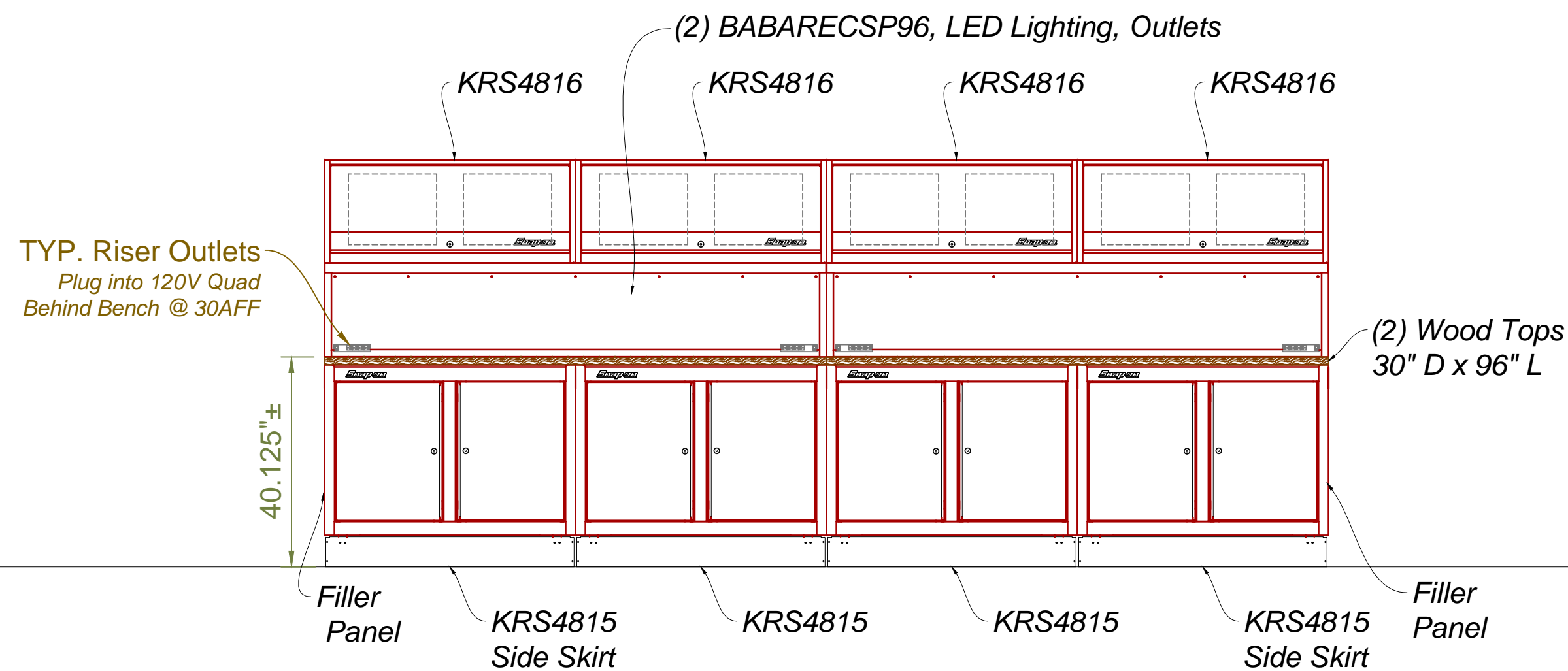
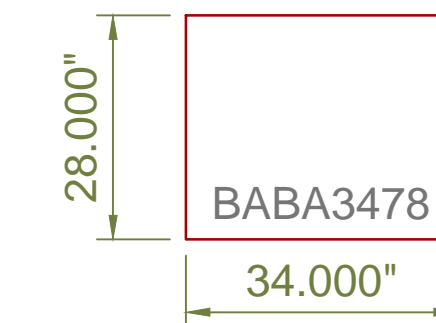
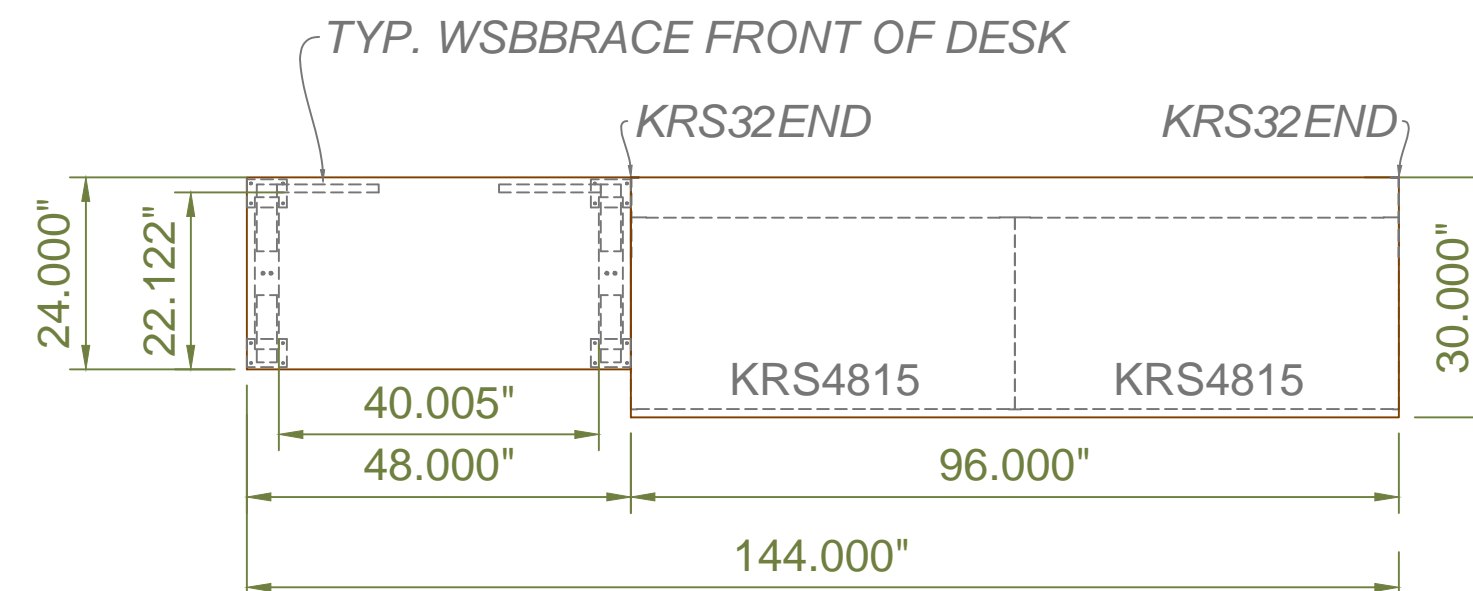
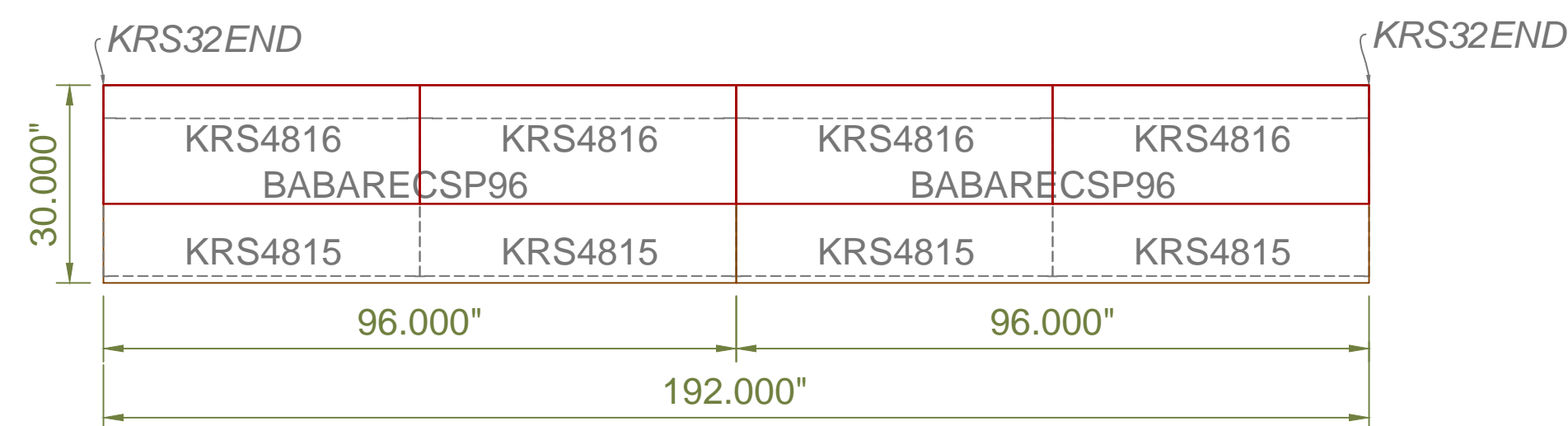
APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Diesel Classroom 204 BAB 042563



Regional Manager
TONY SHASHA
1-562-335-0289

BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX



B = 1 Unit

- Each Unit Consists:
- (2) Wood Tops, 30" D x 96" L
 - (4) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (2) BABARECSP96 Riser, LED Lights, Electric Outlets
 - (4) KRS4816 Overhead Cabinets
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
- Color: RED

P1 = 1 Unit

- ADA Work Station
- Each Unit Consists:
- (1) Wood Top, 30" D x 96" L
 - (1) Wood Top, 24" D x 48" L
 - (2) KRS4815 Bulk Cabinet, 1 Slide Out Drawer Per Door
 - (2) KRS32END Filler Panels
 - (1) KSSKRT24SET Side Skirt Set
 - (2) WSBLEGADNJ Adj. Bench Leg - ADA Compliant 28.162" H - 42.162" H
 - (2) WSBBRACE 18" Leg Brace
- Color: RED

H = 2 Units

- Each Unit Consists:
- (1) BABA3478 Tall Cabinet 34" W x 28" D x 77.75" H
 - (5) Adjustable Shelves Lockable
- Color: RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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PROJECT NO: 20_80_042563

DRAWING NO: BAB-8.1

APPENDIX 02 EQUIPMENT FURNISHINGS

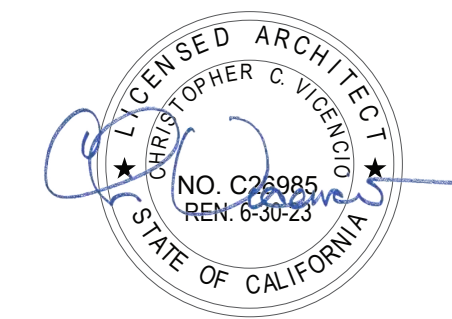
College Of Alameda Diesel Classroom 204 BAB 042563



C = 1 Unit

Each Unit Consists:

- (1) Wood Top, 26" D x 72" L
 - (1) Wood Top, 26" D x 75.4" L
 - (1) Wood Top, 26" D x 68" L
 - (1) KRS7215 Bulk Cabinet
 - (1) KRL711 Standard Drawer - No Base
 - (1) KRL715 Bulk Cabinet - No Base
 - (1) Custom Privacy Panel
 - (2) WSBLEGADJ Adjustable Leg
 - (2) WSBBRACE 18" Leg Brace
 - (2) Epic Outlets
- Color = RED



SERVICE PLAN
1/2" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
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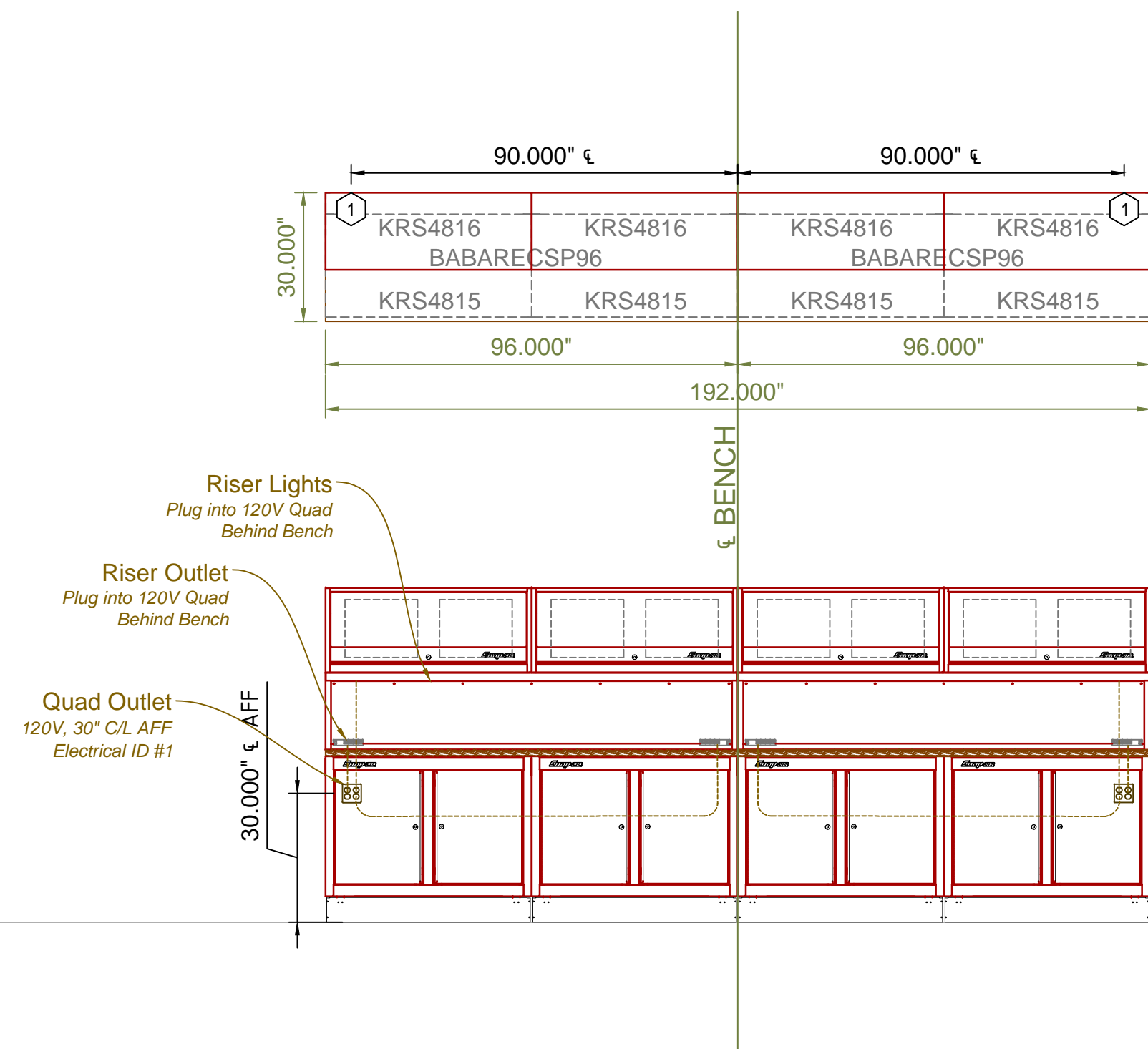
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DRAWING NO: BAB-8.2

APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda
Electrical Detail
BAB 042563

SBS EQUIPMENT ELECTRICAL REQUIREMENTS		
ID #	MODEL/PRODUCT	VOLTAGE
1	QUAD OUTLET	120V Dedicated Quad Outlet, 20AMPS, 30" C/L AFF
2	DUPLEX OUTLET	120V Dedicated Quad Outlet, 20AMPS, 26" C/L AFF
3	QUAD OUTLET	120V Dedicated Quad Outlet, 20AMPS, 26" C/L AFF

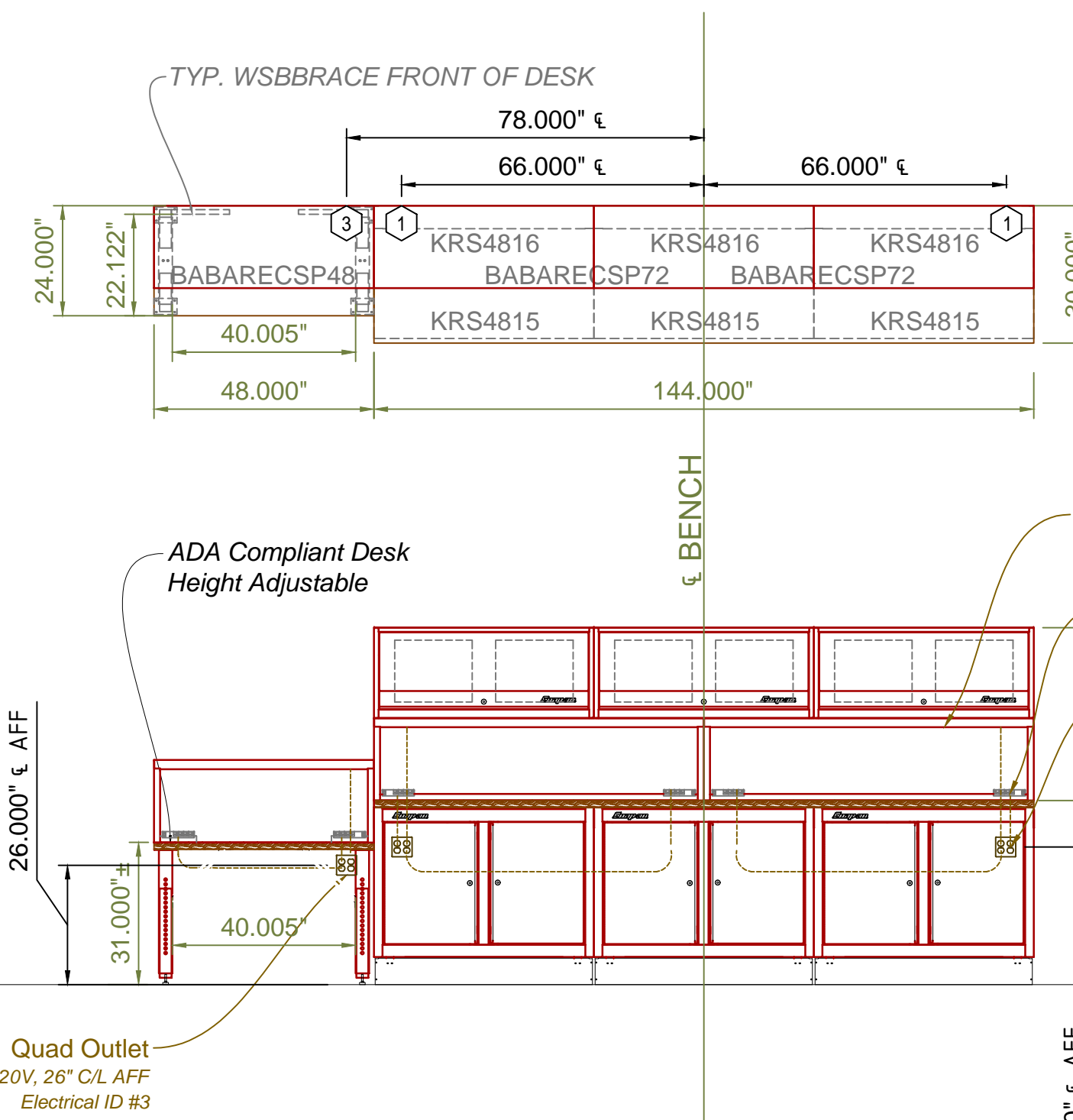


B = 5 Total Units

Each Unit Needs:
(2) 120V Quad Outlets 30" AFF for Riser Electric and Lights
See Electrical ID #1
*Note: Cabinet will be field cut for access to quad outlet

B Unit Locations:
(2) Auto Engine Lab 102
(1) Auto Classroom 103
(1) Auto Body Flex Lab 168
(1) Diesel Classroom 204

SIDE VIEW
• BENCH TOP 30" DEEP
• BOXES ARE 24" DEEP.
• TOOLBOX AND BENCH BOXES HAVE ADJUSTABLE LEGS AND TOTAL HEIGHT MAY GO UP PENDING ANY FLOOR ISSUES.

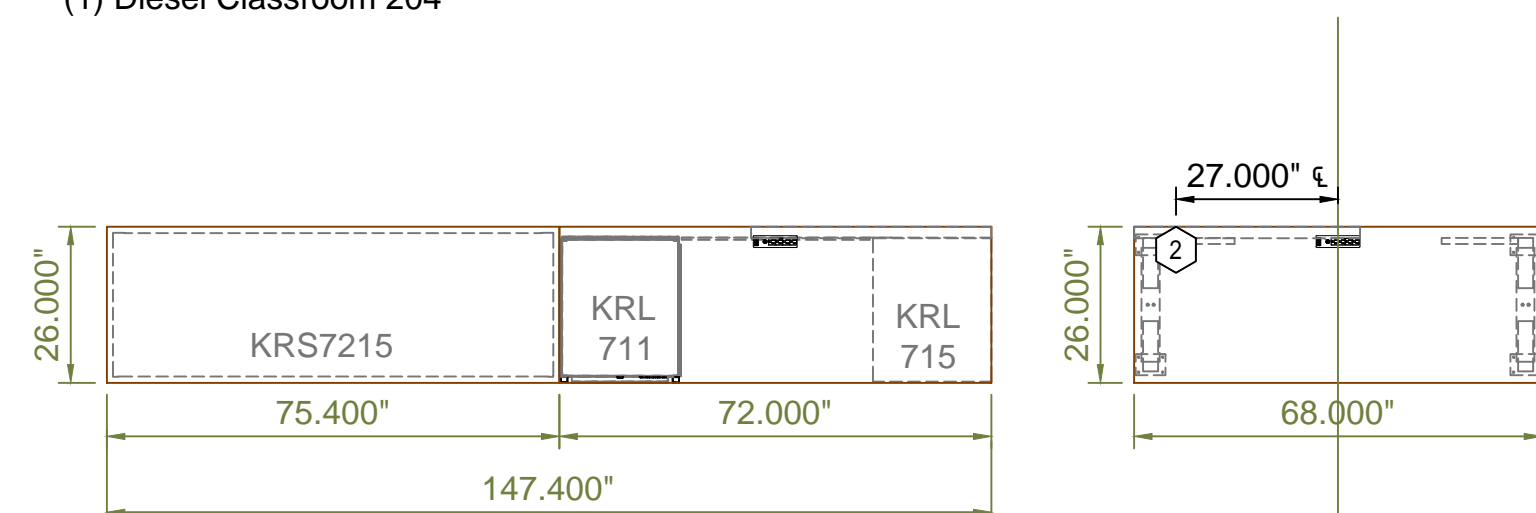


B1 = 1 Total Unit

Each Unit Needs:
(2) 120V Quad Outlets 30" C/L AFF for Riser Electric and Lights
See Electrical ID #1
*Note: Cabinet will be field cut for access to quad outlet
(1) 120V Quad Outlet 26" C/L AFF For Riser Electric and Lights

B1 Unit Locations:
(1) Auto Body Flex Lab 168

SIDE VIEW
• BENCH TOP 30" DEEP
• ADA BENCH TOP 24" DEEP.
• TOOLBOX AND BENCH BOXES HAVE ADJUSTABLE LEGS AND TOTAL HEIGHT MAY GO UP PENDING ANY FLOOR ISSUES.

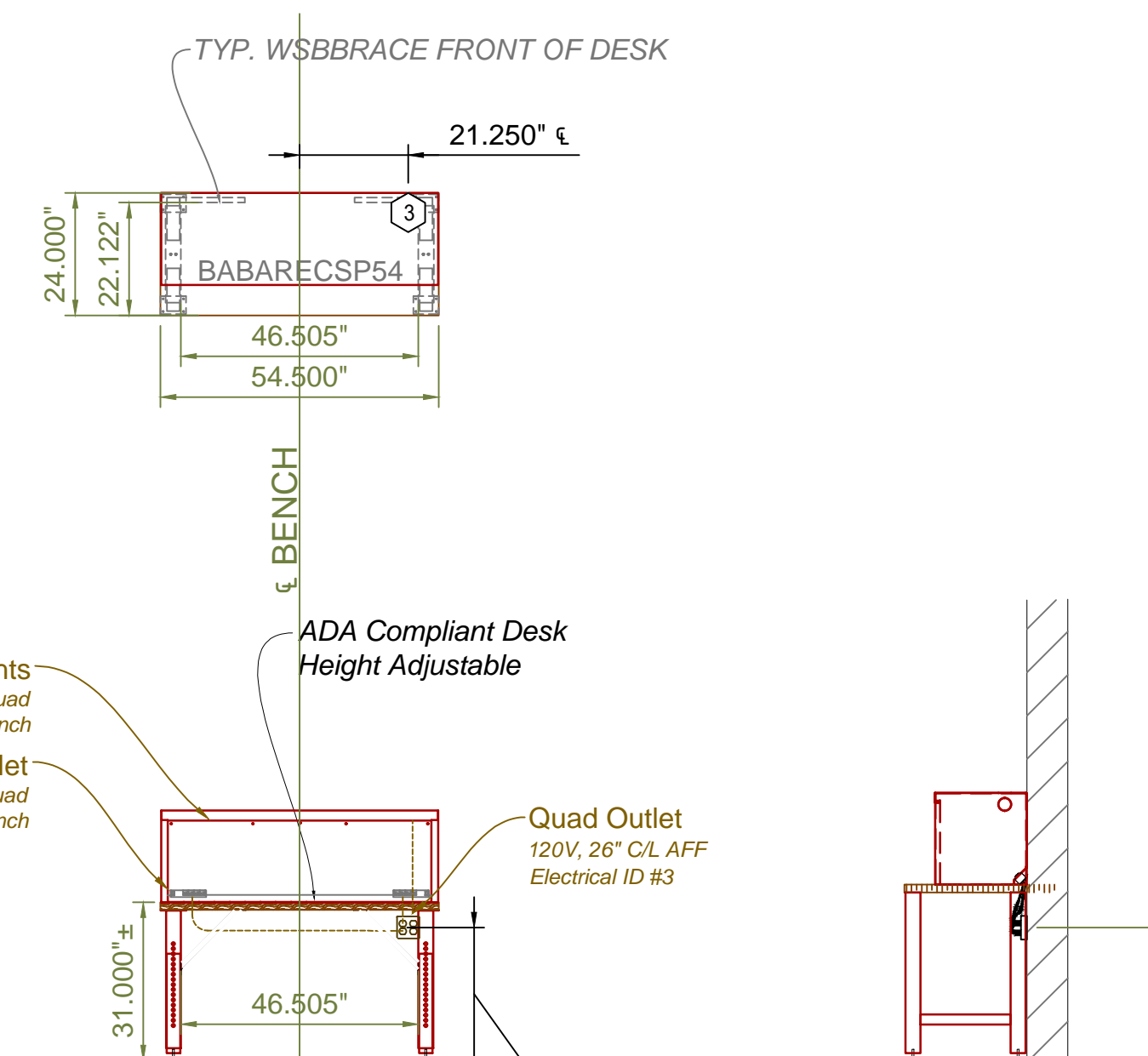


C = 1 Total Unit

Each Unit Needs:
(1) 120V Duplex Outlet 26" C/L AFF for Desk/Bench Electrical
See Electrical ID #2
*Note: Electrical to be ran through cable management duct to duplex location on wall.

C Unit Locations:
(1) Diesel Classroom 204

SIDE VIEW
• BENCH/DESK TOP 26" DEEP

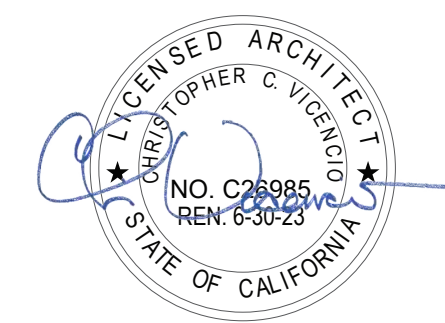


J1 = 2 Total Units

Each Unit Needs:
(1) 120V Quad Outlet 26" C/L AFF for Desk/Bench Electrical
See Electrical ID #3

J1 Unit Locations:
(1) Auto Engine Lab 102
(1) Auto Classroom 103

SIDE VIEW
• BENCH/DESK TOP 24" DEEP



SERVICE PLAN
3/8" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
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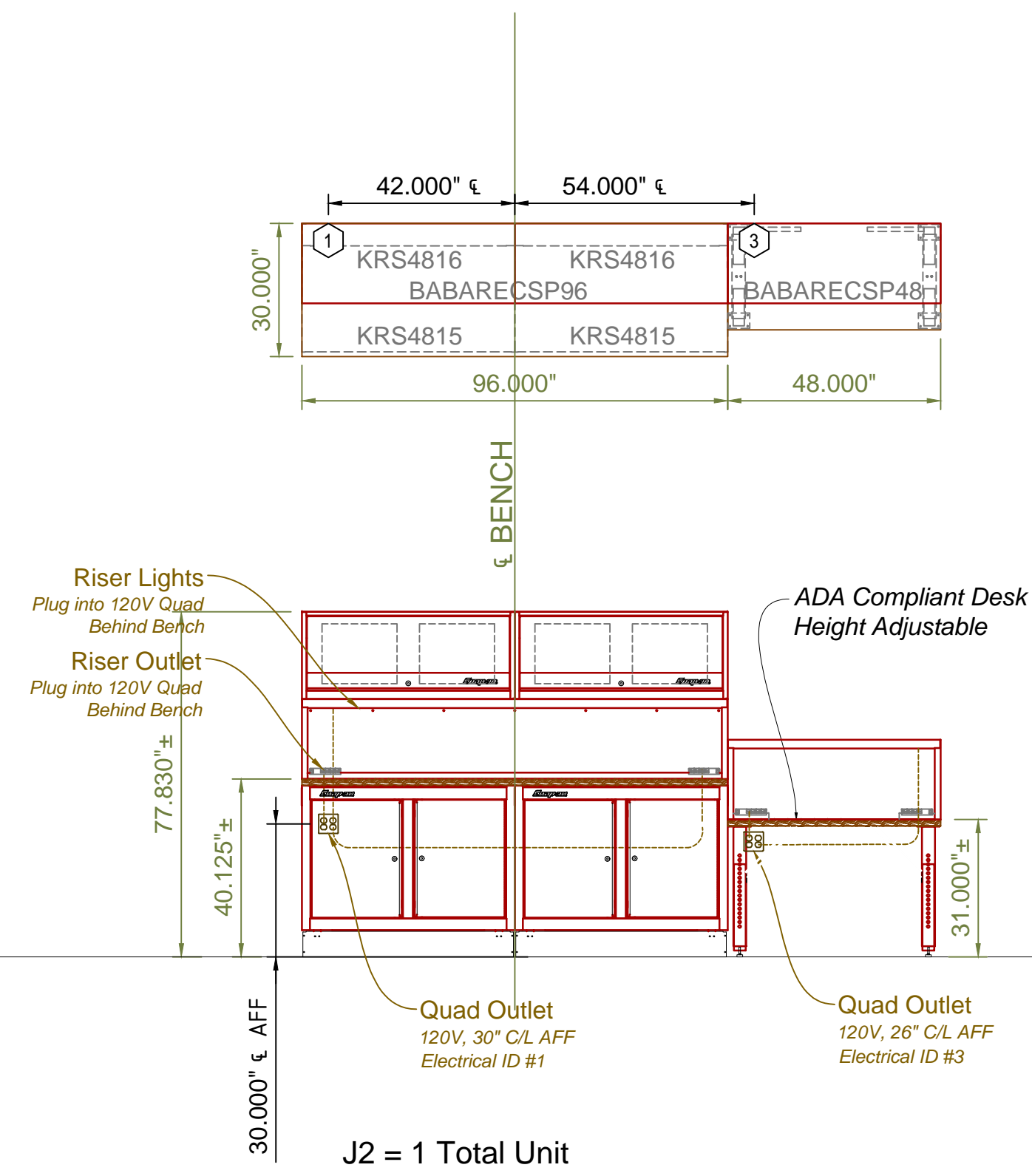
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DRAWING NO: BAB-9

APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Electrical Detail BAB 042563

SBS EQUIPMENT ELECTRICAL REQUIREMENTS		
ID #	MODEL/PRODUCT	VOLTAGE
1	QUAD OUTLET	120V Dedicated Quad Outlet, 20AMPS, 30" C/L AFF
2	DUPLEX OUTLET	120V Dedicated Quad Outlet, 20AMPS, 26" C/L AFF
3	QUAD OUTLET	120V Dedicated Quad Outlet, 20AMPS, 26" C/L AFF

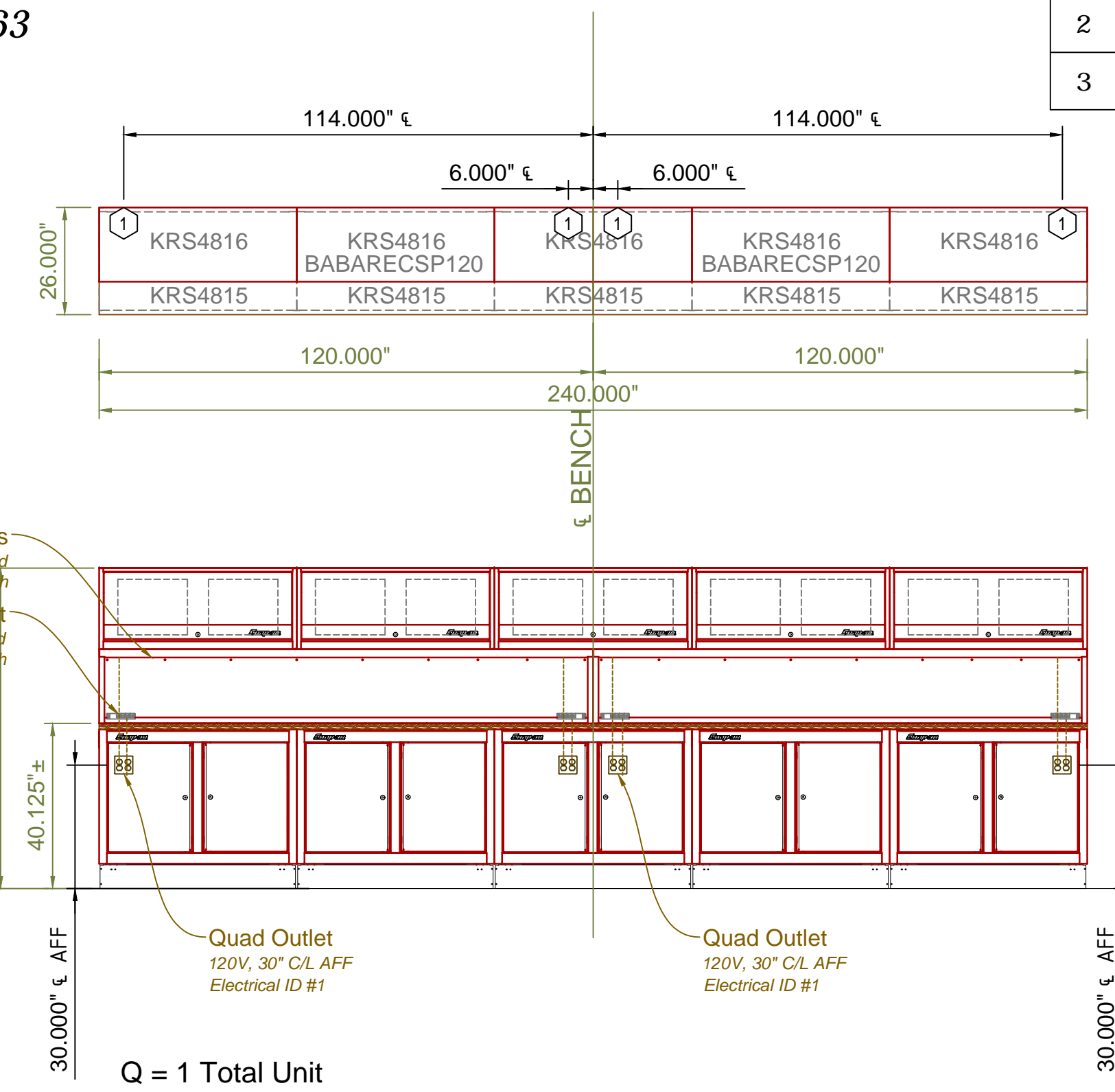


J2 = 1 Total Unit

Each Unit Needs:
 (1) 120V Quad Outlets 30" C/L AFF for Riser Electric and Lights
 See Electrical ID #1
 *Note: Cabinet will be field cut for access to quad outlet
 (1) 120V Quad Outlet 26" C/L AFF For Riser Electric and Lights

J2 Unit Location:
 (1) Auto Classroom 106

- SIDE VIEW**
- BENCH TOP 30" DEEP
 - BOXES ARE 24" DEEP.
 - TOOLBOX AND BENCH BOXES HAVE ADJUSTABLE LEGS AND TOTAL HEIGHT MAY GO UP PENDING ANY FLOOR ISSUES.

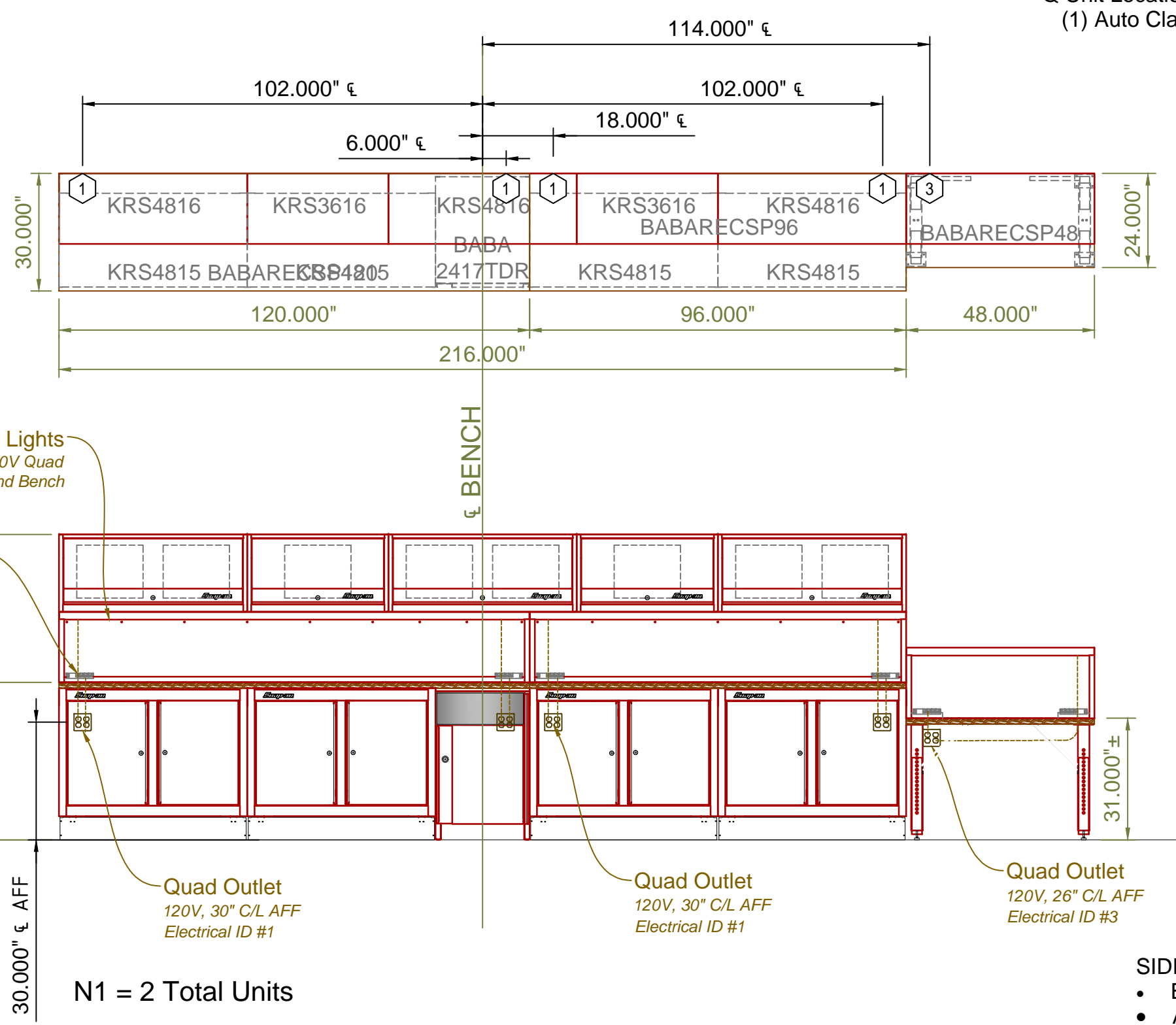


Q = 1 Total Unit

Each Unit Needs:
 (4) 120V Quad Outlets 30" AFF for Riser Electric and Lights
 See Electrical ID #1
 *Note: Cabinet will be field cut for access to quad outlet

Q Unit Location:
 (1) Auto Classroom 106

- SIDE VIEW**
- BENCH TOP 26" DEEP
 - BOXES ARE 24" DEEP.
 - TOOLBOX AND BENCH BOXES HAVE ADJUSTABLE LEGS AND TOTAL HEIGHT MAY GO UP PENDING ANY FLOOR ISSUES.

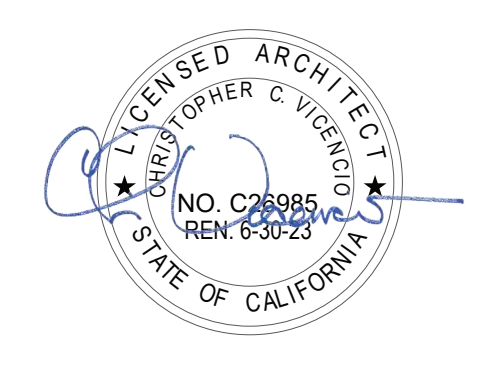


N1 = 2 Total Units

Each Unit Needs:
 (4) 120V Quad Outlets 30" C/L AFF for Riser Electric and Lights
 See Electrical ID #1
 *Note: Cabinet will be field cut for access to quad outlet
 (1) 120V Quad Outlet 26" C/L AFF For Riser Electric and Lights

N1 Unit Location:
 (1) Auto Classroom 104
 (1) Auto Classroom 105

- SIDE VIEW**
- BENCH TOP 30" DEEP
 - ADA BENCH TOP 24" DEEP.
 - TOOLBOX AND BENCH BOXES HAVE ADJUSTABLE LEGS AND TOTAL HEIGHT MAY GO UP PENDING ANY FLOOR ISSUES.



SERVICE PLAN
 3/8" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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Regional Manager
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BUILD-A-BAY EQUIPMENT PLAN
 FOR
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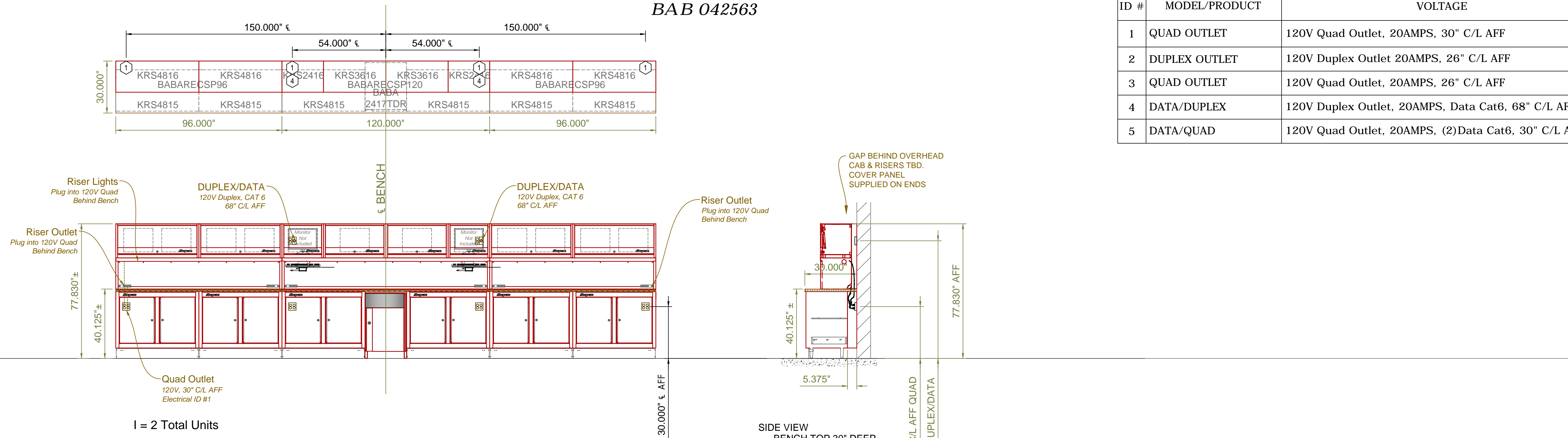
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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Electrical Detail BAB 042563

SBS EQUIPMENT ELECTRICAL REQUIREMENTS		
ID #	MODEL/PRODUCT	VOLTAGE
1	QUAD OUTLET	120V Quad Outlet, 20AMPS, 30" C/L AFF
2	DUPLEX OUTLET	120V Duplex Outlet 20AMPS, 26" C/L AFF
3	QUAD OUTLET	120V Quad Outlet, 20AMPS, 26" C/L AFF
4	DATA/DUPLEX	120V Duplex Outlet, 20AMPS, Data Cat6, 68" C/L AFF
5	DATA/QUAD	120V Quad Outlet, 20AMPS, (2)Data Cat6, 30" C/L AFF



I = 2 Total Units

Each Unit Needs:

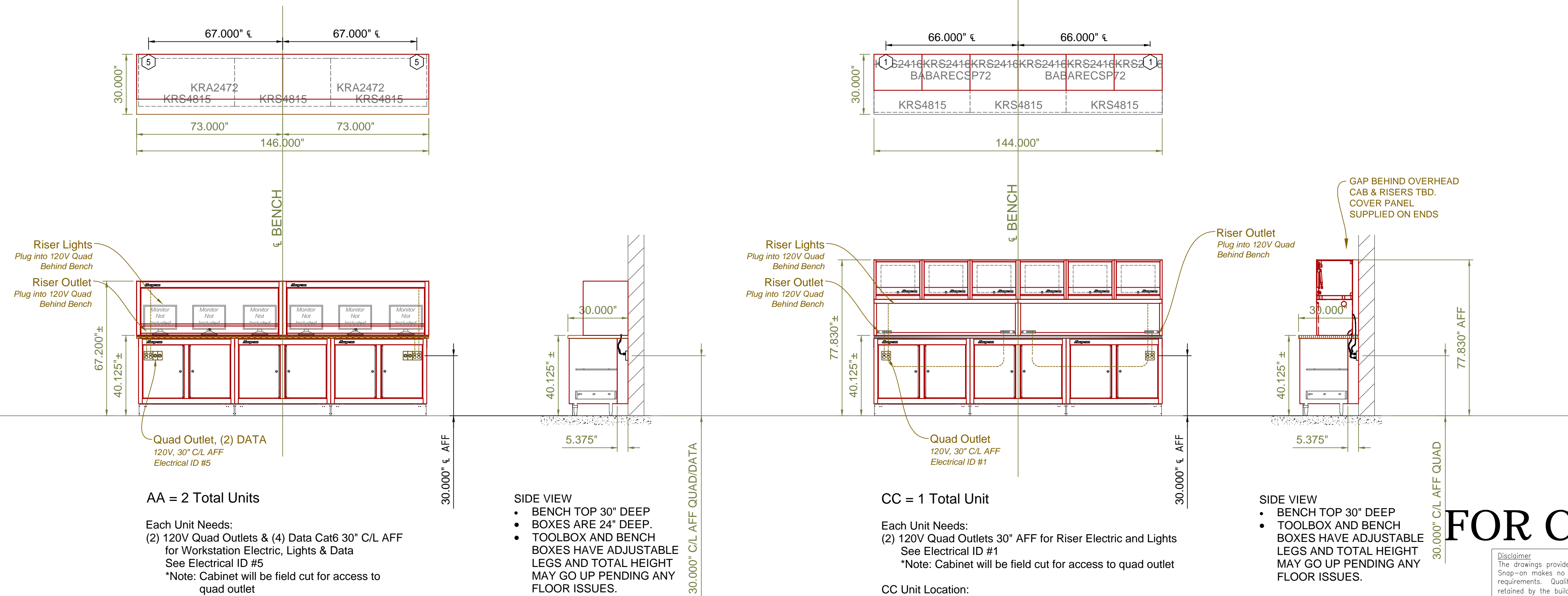
- (4) 120V Quad Outlets 30" AFF for Riser Electric and Lights See Electrical ID #1
- *Note: Cabinet will be field cut for access to quad outlet
- (2) 120V Duplex Outlets & Data Cat6 for PC Overhead Cabs See Electrical ID #4

I Unit Locations:

- (2) Auto Engine Lab 102

SIDE VIEW

- BENCH TOP 30" DEEP
- BOXES ARE 24" DEEP.
- TOOLBOX AND BENCH BOXES HAVE ADJUSTABLE LEGS AND TOTAL HEIGHT MAY GO UP PENDING ANY FLOOR ISSUES.



AA = 2 Total Units

Each Unit Needs:

- (2) 120V Quad Outlets & (4) Data Cat6 30" C/L AFF for Workstation Electric, Lights & Data See Electrical ID #5
- *Note: Cabinet will be field cut for access to quad outlet

AA Unit Locations:

- (1) Auto Lab 198
- (1) Auto Body Hallway

CC = 1 Total Unit

Each Unit Needs:

- (2) 120V Quad Outlets 30" AFF for Riser Electric and Lights See Electrical ID #1
- *Note: Cabinet will be field cut for access to quad outlet

CC Unit Location:

- (1) Auto Lab 198

SIDE VIEW

- BENCH TOP 30" DEEP
- TOOLBOX AND BENCH BOXES HAVE ADJUSTABLE LEGS AND TOTAL HEIGHT MAY GO UP PENDING ANY FLOOR ISSUES.



SERVICE PLAN
3/8" = 1'-0" (24" x 36")

FOR CONSTRUCTION

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BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
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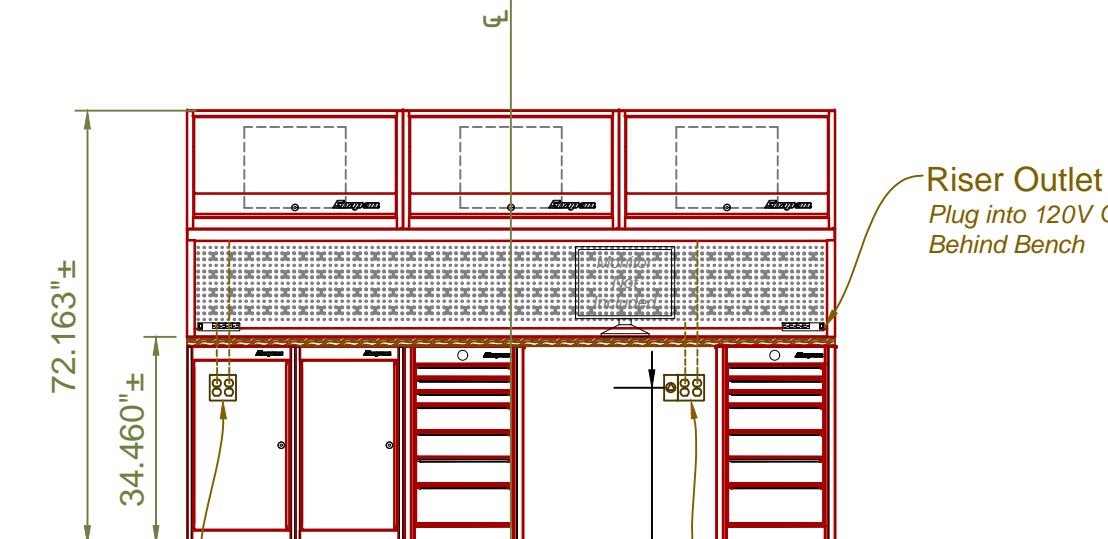
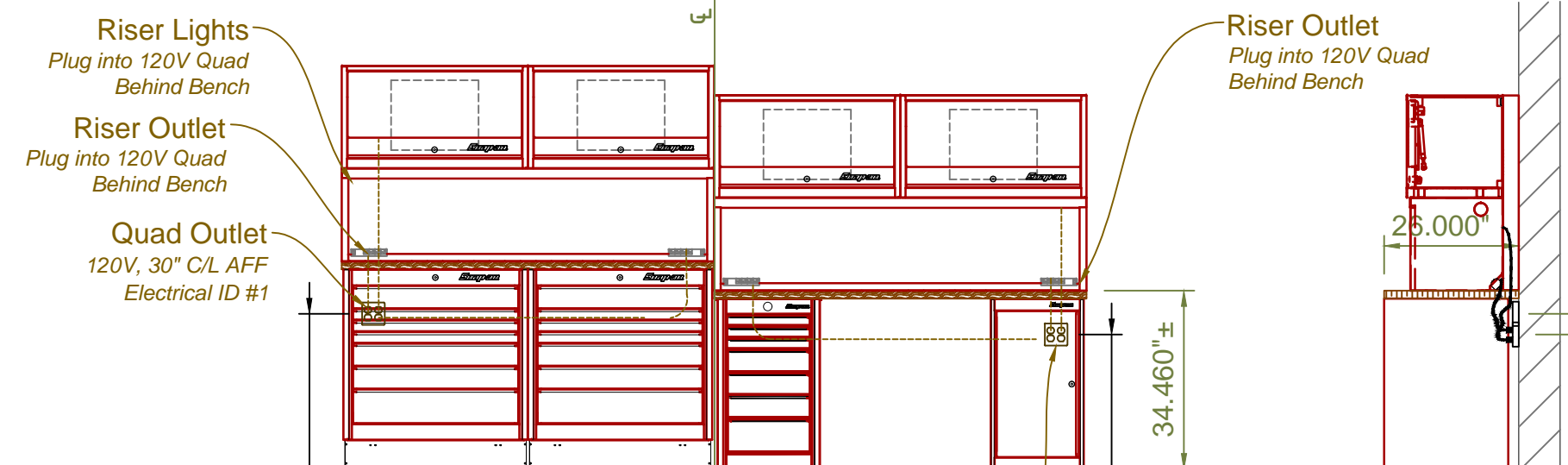
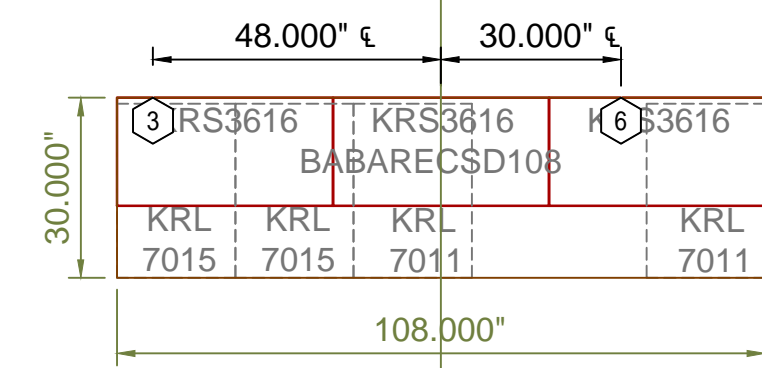
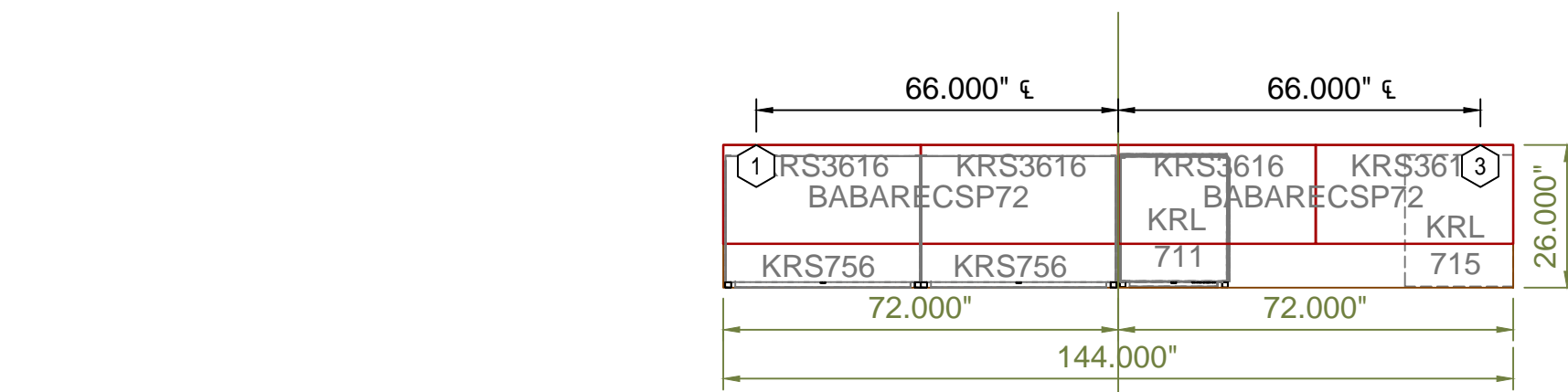
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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Electrical Detail BAB 042563

SBS EQUIPMENT ELECTRICAL REQUIREMENTS		
ID #	MODEL/PRODUCT	VOLTAGE
1	QUAD OUTLET	120V Quad Outlet, 20AMPS, 30" C/L AFF
2	DUPLEX OUTLET	120V Duplex Outlet 20AMPS, 26" C/L AFF
3	QUAD OUTLET	120V Quad Outlet, 20AMPS, 26" C/L AFF
4	DATA/DUPLEX	120V Duplex Outlet, 20AMPS, Data Cat6, 68" C/L AFF
5	DATA/QUAD	120V Quad Outlet, 20AMPS, (2)Data Cat6, 30" C/L AFF
6	DATA/QUAD	120V Quad Outlet, 20AMPS, (1)Data Cat6, 26" C/L AFF



R = 1 Total Unit

- Each Unit Needs:
- (1) 120V Quad Outlet 30" C/L AFF
 - (1) 120V Quad Outlet 26" C/L AFF for Riser Electric & Lights See Electrical ID #1, #3

R Unit Location:
(1) Shared Tool Room

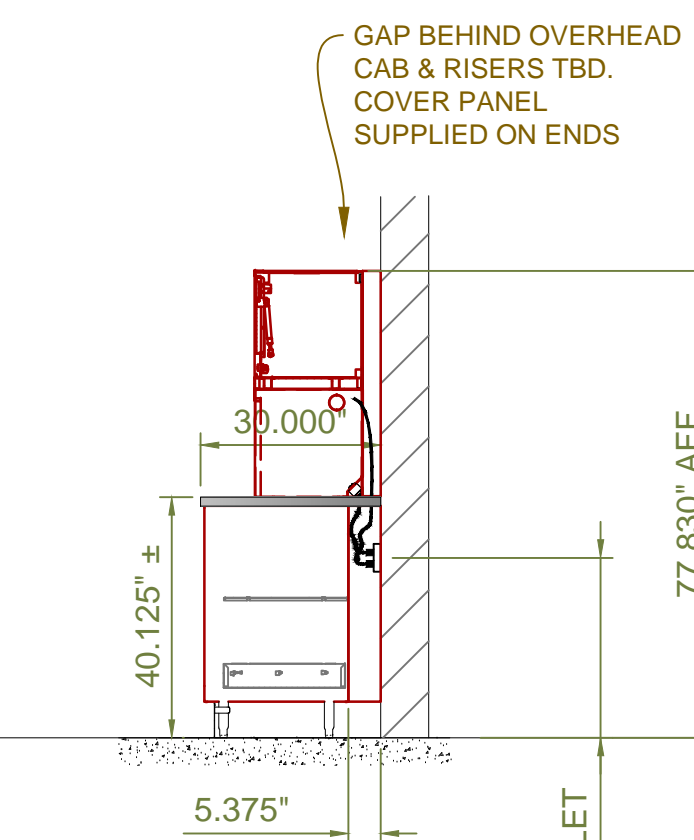
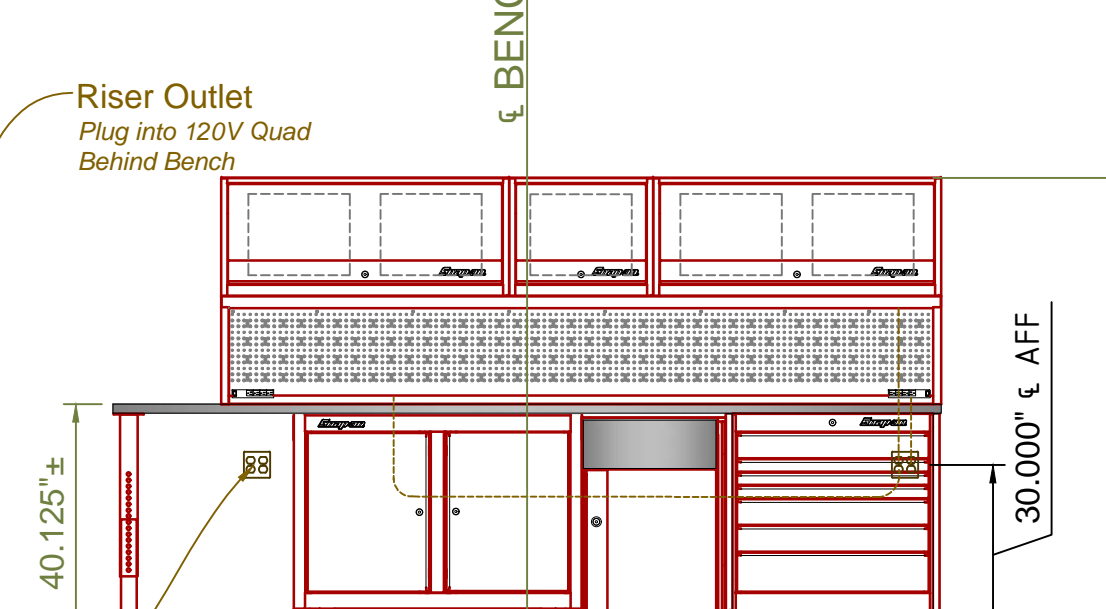
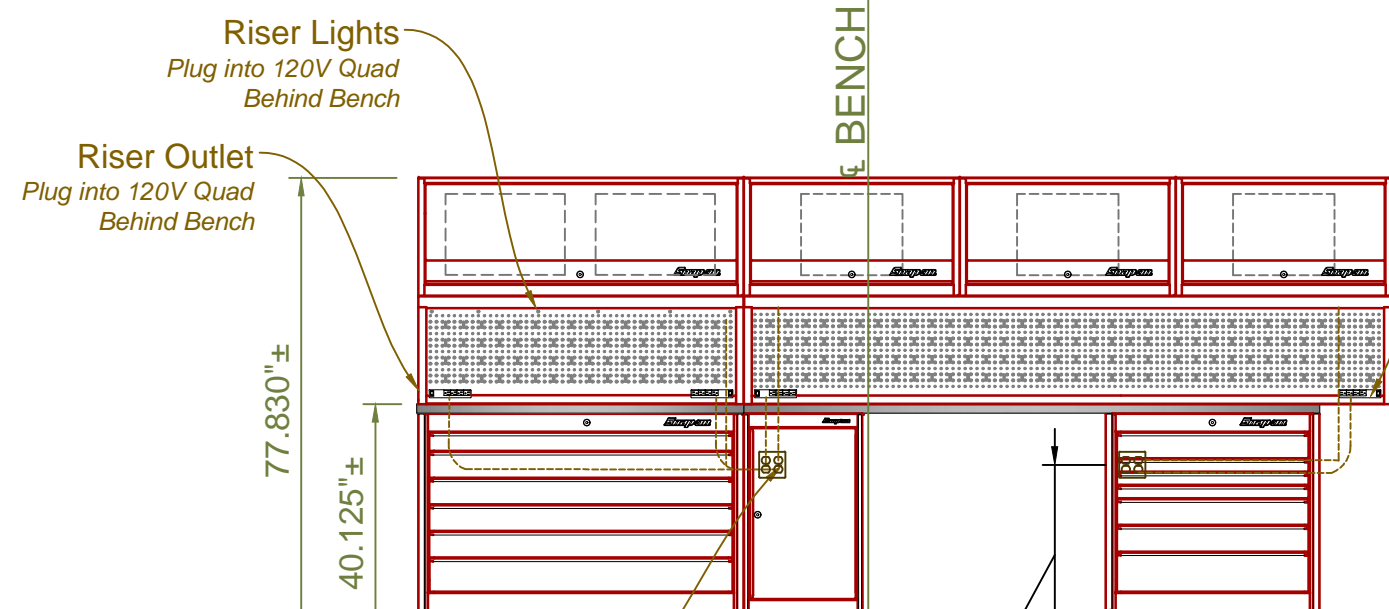
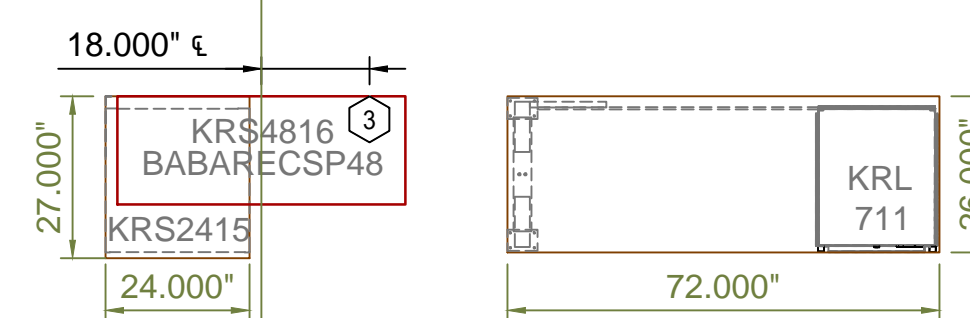
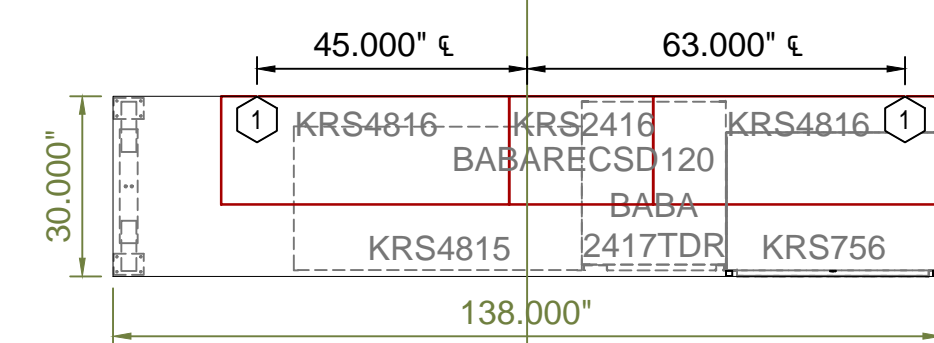
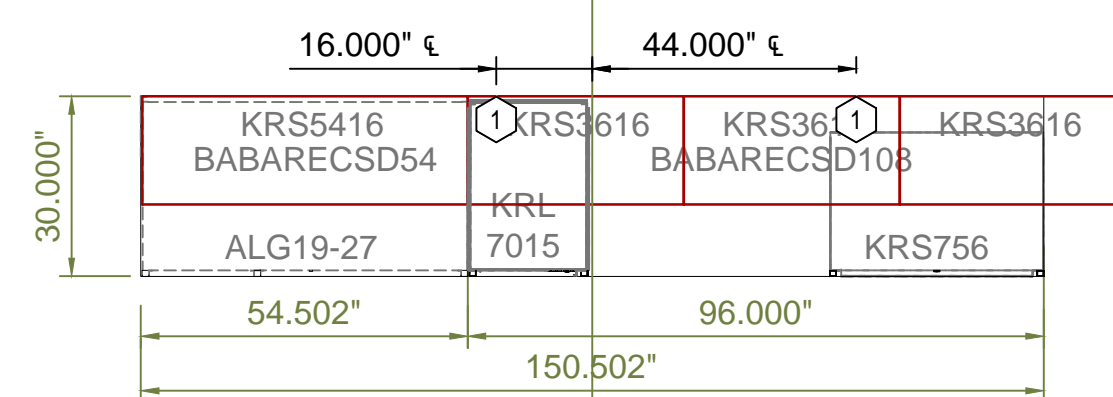
- SIDE VIEW
- BENCH TOP 30" DEEP
 - BENCH CABINETS ARE 24" DEEP
 - TOOLBOXES ARE 24" DEEP

R3 = 1 Total Unit

- Each Unit Needs:
- (2) 120V Quad Outlets 26" C/L AFF
 - (1) Data Cat6 26" C/L AFF for Riser Electric & Lights See Electrical ID #3, #6
- *Note: Cabinet will be field cut for access to quad outlet

R Unit Location:
(1) Shared Tool Room

- SIDE VIEW
- BENCH TOP 30" DEEP
 - BENCH CABINETS ARE 29" DEEP



V = 1 Total Unit

- Each Unit Needs:
- (4) 120V Quad Outlets 30" AFF for Riser Electric and Lights See Electrical ID #1
- *Note: Cabinet will be field cut for access to quad outlet

V Unit Location:
(1) Share Tool Room 165B

- SIDE VIEW
- BENCH TOP 30" DEEP
 - BOXES ARE 24"/29" DEEP.
 - TOOLBOX AND BENCH BOXES HAVE ADJUSTABLE LEGS AND TOTAL HEIGHT MAY GO UP PENDING ANY FLOOR ISSUES.

BB1 = 3 Total Units

- Each Unit Needs:
- (1) 120V Quad Outlets 26" C/L AFF for Riser Electric & Lights See Electrical ID #3

BB1: Unit Locations:
(1) Referee Office 159
(1) Auto Body Office 166
(1) Diesel Office 210

- SIDE VIEW
- BENCH TOP 27" DEEP
 - BENCH CABINETS ARE 24" DEEP

FOR CONSTRUCTION

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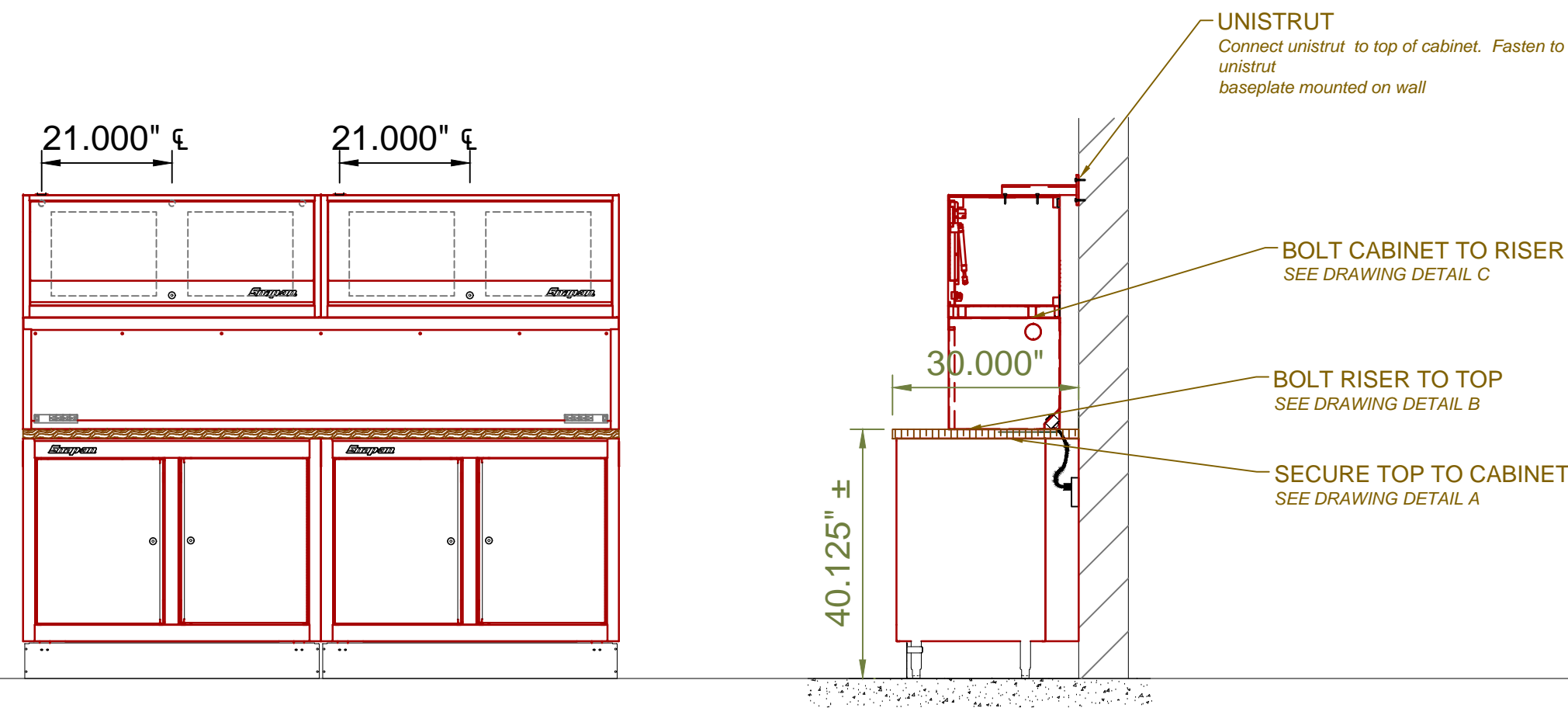
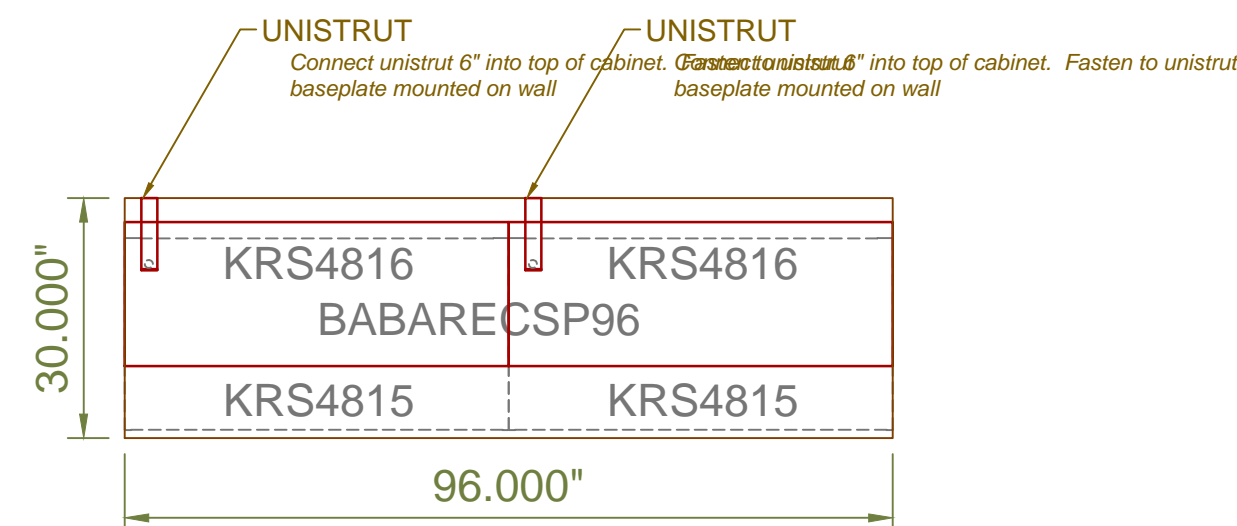


BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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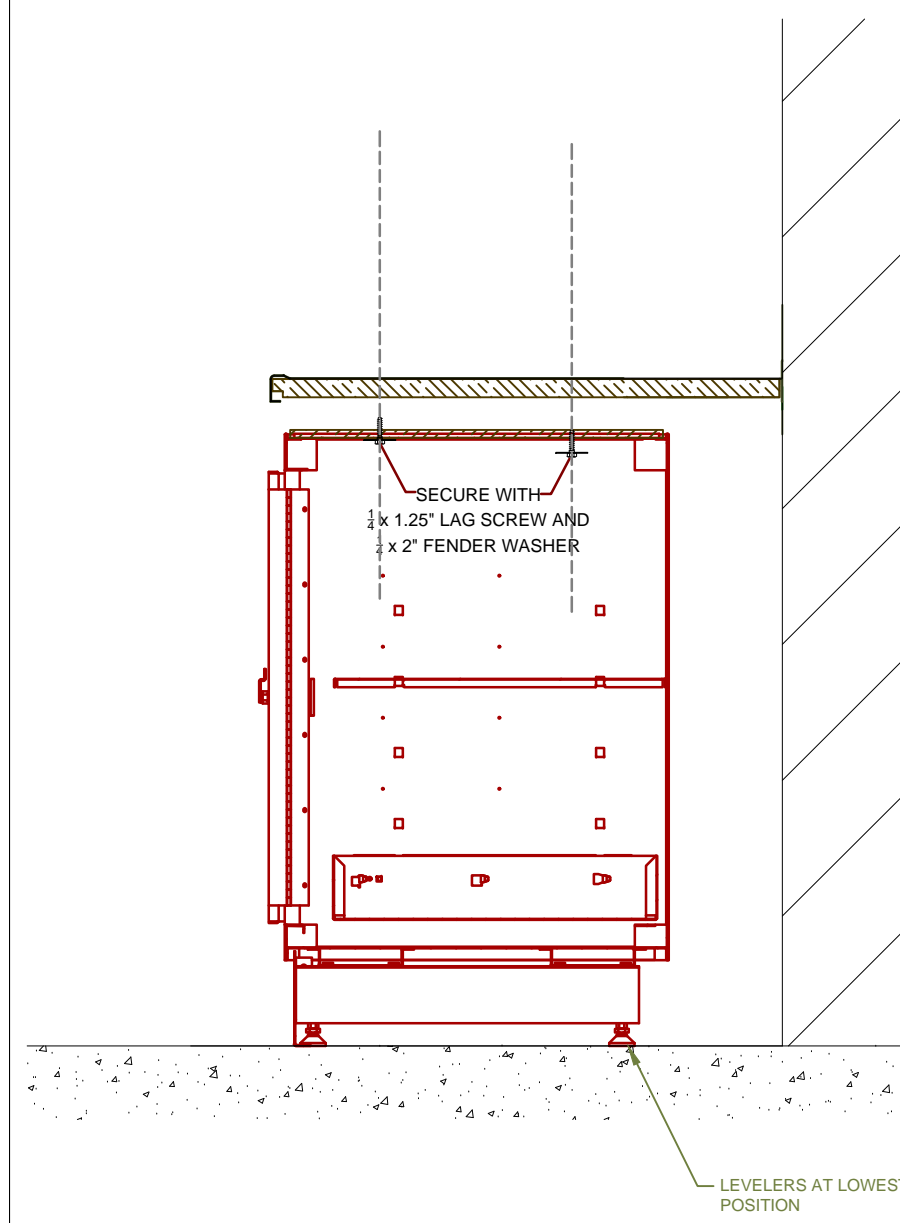
APPENDIX 02 EQUIPMENT FURNISHINGS

TYPICAL BUILD-A-BAY INSTALL DETAIL RISER AND OVERHEAD OFFSET FROM WALL



TYPICAL OH OFFSET FROM WALL SECURED WITH UNISTRUT

TYPICAL BUILD-A-BAY INSTALL DETAIL A

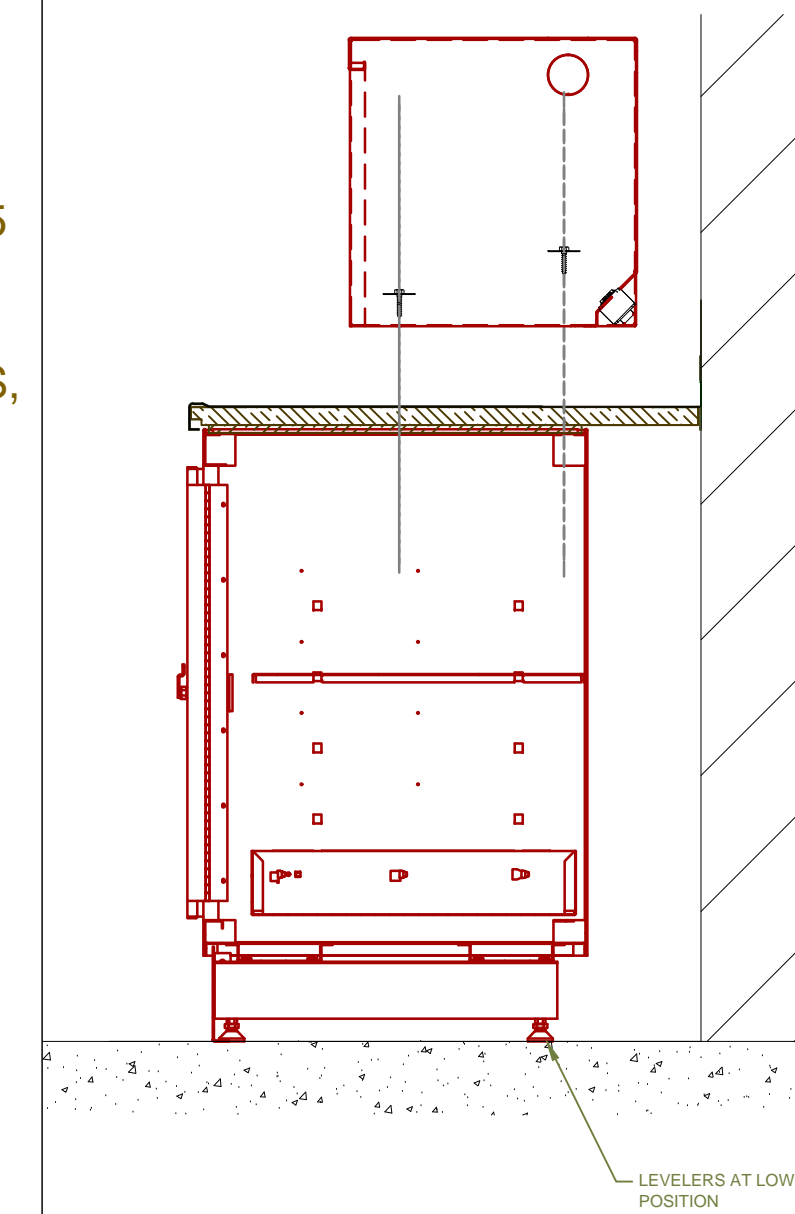


DETAIL A INSTALL WORKSURFACE:

1. INSTALL SHIMS AND FILLER BAR ON TOP OF CABINET IF NECESSARY AND SECURE WITH PROVIDED #6-20 X .375 SCREWS
2. USING THE PROVIDED 1/4" X 1.25 SCREWS AND 1/4" FENDER WASHERS, SECURE WORKSURFACE TO STATIONARY UNIT.

NOTE: IT MAY BE NECESSARY TO PREDRILL

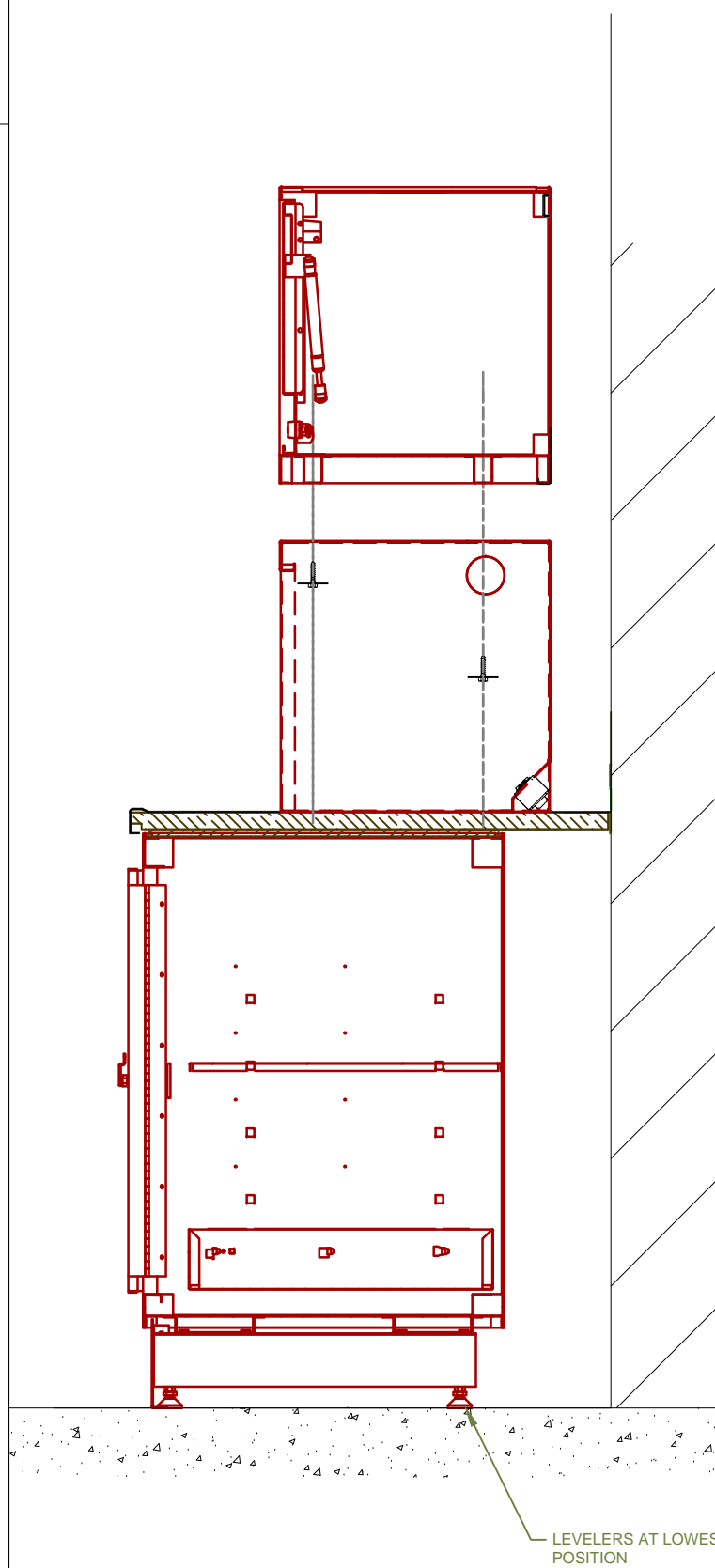
TYPICAL BUILD-A-BAY INSTALL DETAIL B



DETAIL B INSTALL RISER:

1. POSITION RISER ONTO WORKSURFACE IN DESIRED LOCATION.
2. MARK HOLES
3. CENTERPUNCH AND DRILL (4) 11/64" HOLES THROUGH WORKSURFACE.
4. FASTEN RISER TO WORKSURFACE USING THE #2 X 1.00 DRILL POINT SCREWS AND 1/4" WASHERS PROVIDED.

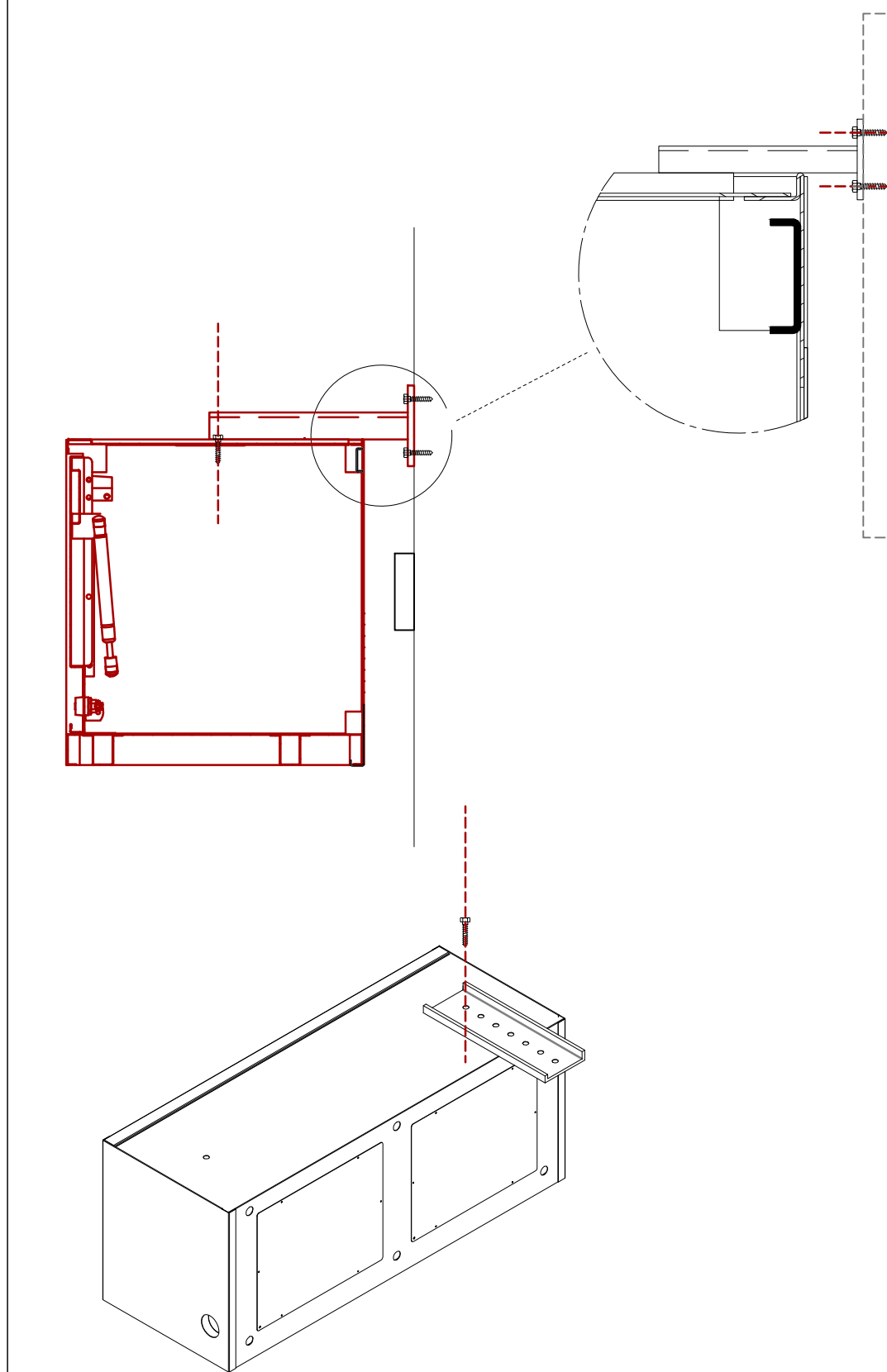
TYPICAL BUILD-A-BAY INSTALL DETAIL C



DETAIL C INSTALL OVERHEAD:

1. OVERHEADS MUST BE FASTENED TO RISERS WITH #12 X 1.00 DRILL POINT SCREWS AND 1/4" WASHERS PROVIDED. RISERS DO NOT COME WITH HOLES, SO THE HOLES MUST BE FIELD DRILLED.
 - 1.a. LOCATE OVERHEAD BOTTOM SKIDS, MEASURING THEIR LOCATIONS RELATIVE TO THE BACK PANEL. TRANSFER THESE DIMENSIONS TO THE TOP OF THE RISER, MEASURING FROM THE BACK PANEL.
 - 1.b. DRILL (4) 1/4" HOLES PER OVERHEAD SO THAT THE OVERHEAD WILL BE FASTENED TO THE RISER NEAR EACH CORNER OF THE OVERHEAD.
 - 1.c. FASTEN THE OVERHEAD TO THE RISER USING THE #12 X 1.00 DRILL POINT SCREWS AND 1/4" WASHERS PROVIDED.

TYPICAL BUILD-A-BAY INSTALL DETAIL D



DETAIL D SECURING OVERHEAD TO WALL:

1. CONNECT ANCHOR BASE UNISTRUT TO WALL WITH 3/8" x 3" WEDGE ANCHORS.
2. FASTEN UNISTRUT TO TOP OF CABINET WITH #12 X 1.00 DRILLPOINT SCREWS AND 1/4" WASHERS. HOLES WILL NEED TO BE FIELD DRILLED.



SERVICE PLAN
NTS

FOR CONSTRUCTION

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SERVICE PLAN
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Regional Manager
TONY SHASHA
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BUILD-A-BAY EQUIPMENT PLAN
FOR
COLLEGE OF ALAMEDA AUTOMOTIVE
XX

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APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Rivet Shelving Anchoring BAB 042563

ASSEMBLY INSTRUCTIONS

STEP #1--ASSEMBLY OF RACK END UNITS

FIGURE #1

- 1.) IN ORDER TO BUILD A RACK SECTION, YOU FIRST NEED TO MAKE UP TWO RACK END UNITS.
- 2.) TO MAKE UP AN END UNIT, ASSEMBLE TWO ANGLE POSTS (COMPONENT E) AND TWO DOUBLE-RIVET BEAMS. USE EITHER THE DOUBLE RIVET FLANGED (COMPONENT B), OR THE DOUBLE-RIVET CHANNEL BEAMS, DEPENDING ON YOUR CONFIGURATION AND LOAD REQUIREMENTS.
- 3.) THE BOTTOM BEAMS ARE TO BE NO MORE THAN 3" UP FROM THE FLOOR. USE A RUBBER HAMMER OR MALLET TO SEAT THE RIVETS INTO THE UPRIGHTS.

NOTE:

THE DOUBLE RIVET BEAMS ARE TO BE USED TO MAKE UP THE RACK END UNITS. THIS WILL RESULT IN THE STRONGEST RACK STRUCTURE.

STEP #2--ASSEMBLY OF SINGLE RACK FRAMES

FIGURE #2

- 1.) THE BASIC RACK FRAME CONSISTS OF TWO END UNITS AND FOUR DOUBLE RIVET BEAMS.

- 2.) ATTACH THE TWO BOTTOM DOUBLE RIVET BEAMS TO THE TWO END UNITS. USE A RUBBER HAMMER OR MALLET TO SEAT THE RIVETS INTO THE UPRIGHTS. THEN, ATTACH THE TWO TOP DOUBLE RIVET BEAMS.
- 3.) IF REQUIRED, INSTALL CENTER SUPPORT TIES (COMPONENT D) TO THE FRONT AND REAR BEAMS. THE CENTER SUPPORT IS TO BE INSTALLED BETWEEN THE BEAMS AT EVERY LEVEL, USING (4) 1/4"-20 NUTS AND BOLTS PROVIDED. REFER TO LYON CATALOG FOR QUANTITY OF CENTER SUPPORTS REQUIRED BASED UPON LENGTH OF BEAMS USED.

NOTE:

THE DOUBLE RIVET BEAMS ARE TO BE USED TO MAKE UP THE RACK FRAMES. THIS WILL RESULT IN THE STRONGEST RACK STRUCTURE.

- 4.) BUILD UP THE VARIOUS INTERMEDIATE LEVELS AS DESIRED. USE EITHER THE SINGLE-RIVET, THE DOUBLE RIVET-FLANGED, OR THE DOUBLE-RIVET CHANNEL BEAMS, DEPENDING ON YOUR CONFIGURATION AND LOAD REQUIREMENTS.

ASSEMBLY OF CONSECUTIVE RACK FRAMES

FIGURE #3

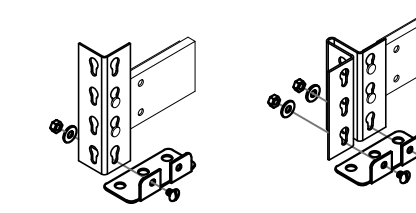
- 1.) FOR ATTACHING TWO OR MORE EXISTING SINGLE RACK ASSEMBLIES TOGETHER, USE THE TIE PLATES (COMPONENT G).
- 2.) AS AN OPTION, YOU MAY USE THE "T" POST STYLE UPRIGHTS FOR THE INTERMEDIATE RACK ENDS (COMPONENT F). BOTH WILL YIELD THE SAME RESULT.
- 3.) FOLLOW THE SAME GUIDELINE IN STEPS 1 AND 2 FOR COMPLETION OF THE SECTIONS.

FOOT PLATE ATTACHEMENT (OPTIONAL)

FIGURE #4

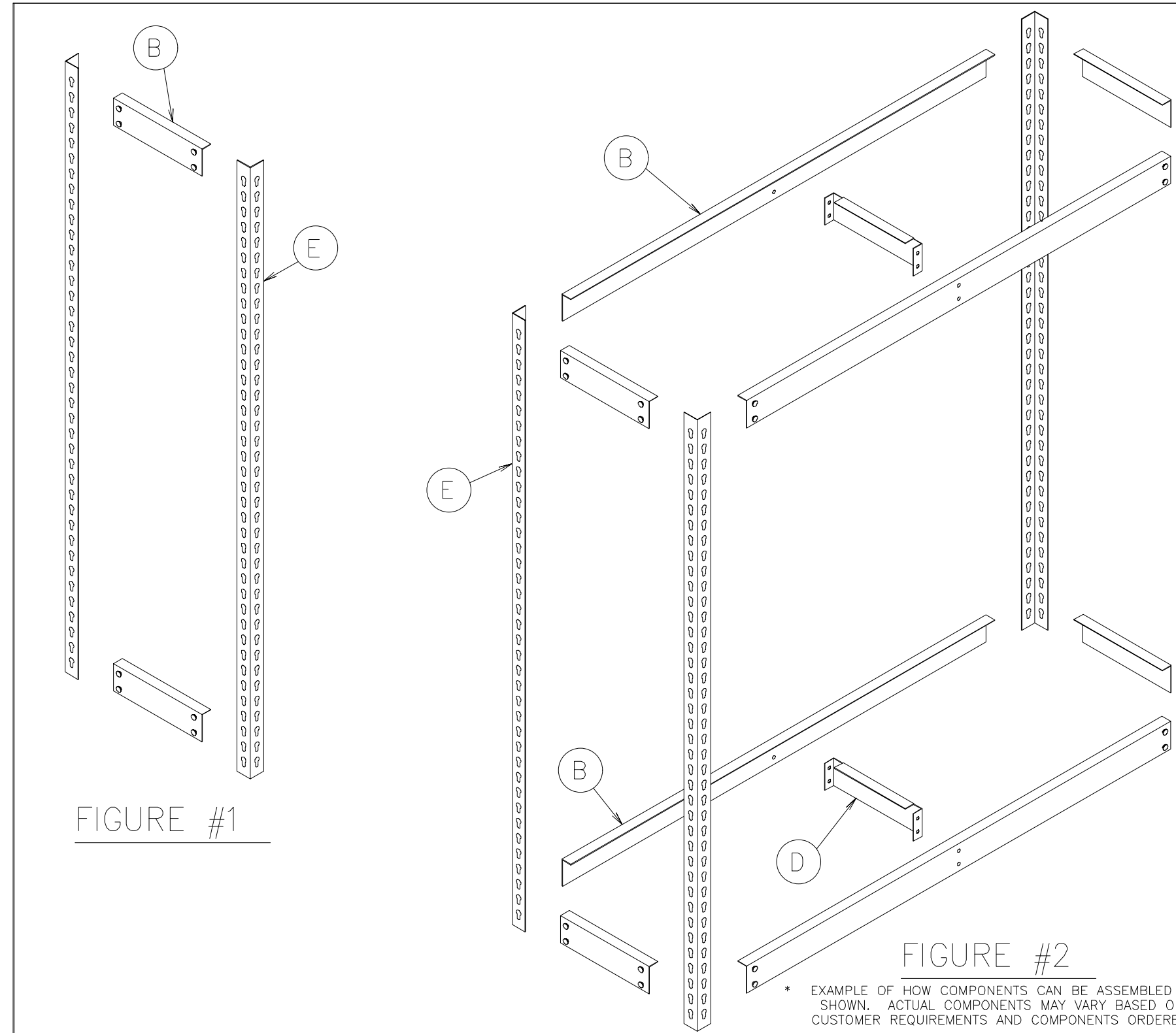
- 1.) IF FOOT PLATES WERE ORDERED, ATTACH FOOT PLATE (COMPONENT H) TO ANGLE POST UPRIGHT USE (1) 1/4-20 X 1/2" TRUSS HEAD BOLTS, WASHERS AND NUTS. POSITION FOOT PLATE SO THAT MAJORITY OF THE FOOTPLATE IS BENEATH THE UNIT.
- 2.) IF FOOT PLATES WERE ORDERED, ATTACH FOOT PLATE (COMPONENT H) TO "T"-POST UPRIGHT USE (2) 1/4-20 X 1/2" TRUSS HEAD BOLTS, WASHERS AND NUTS.
- 3.) LOWEST BEAM MUST BE INSTALLED IN THE SECOND AND THIRD SLOTS WHEN FOOT PLATES ARE USED.

TYPICAL RIVET SHELVING FOOT PLATE

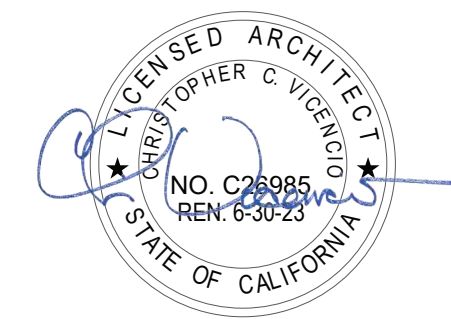
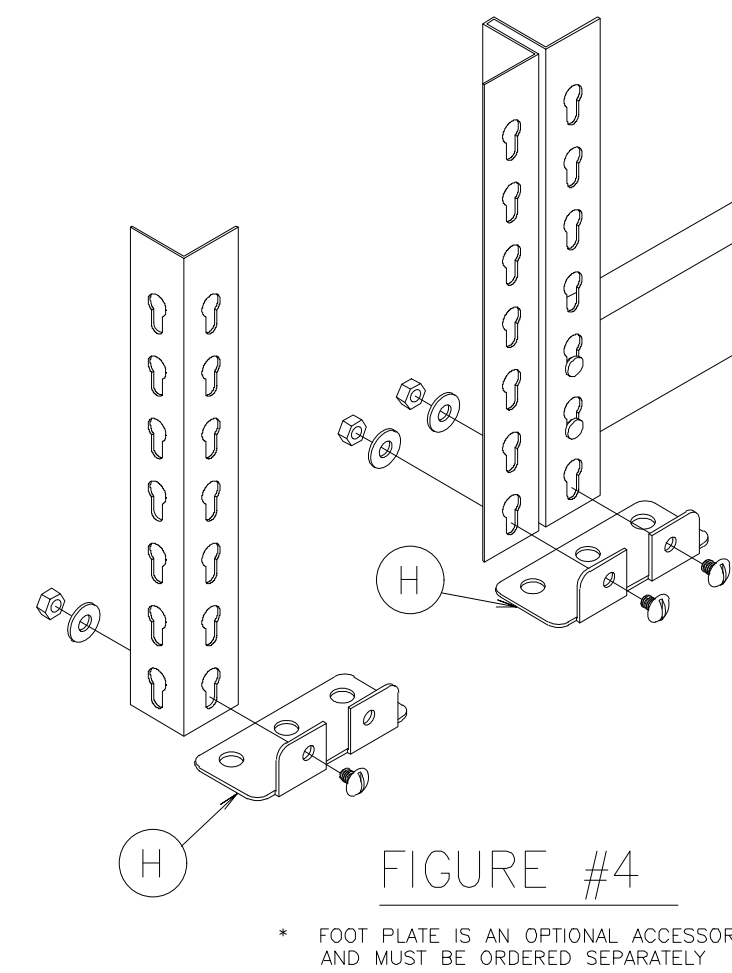
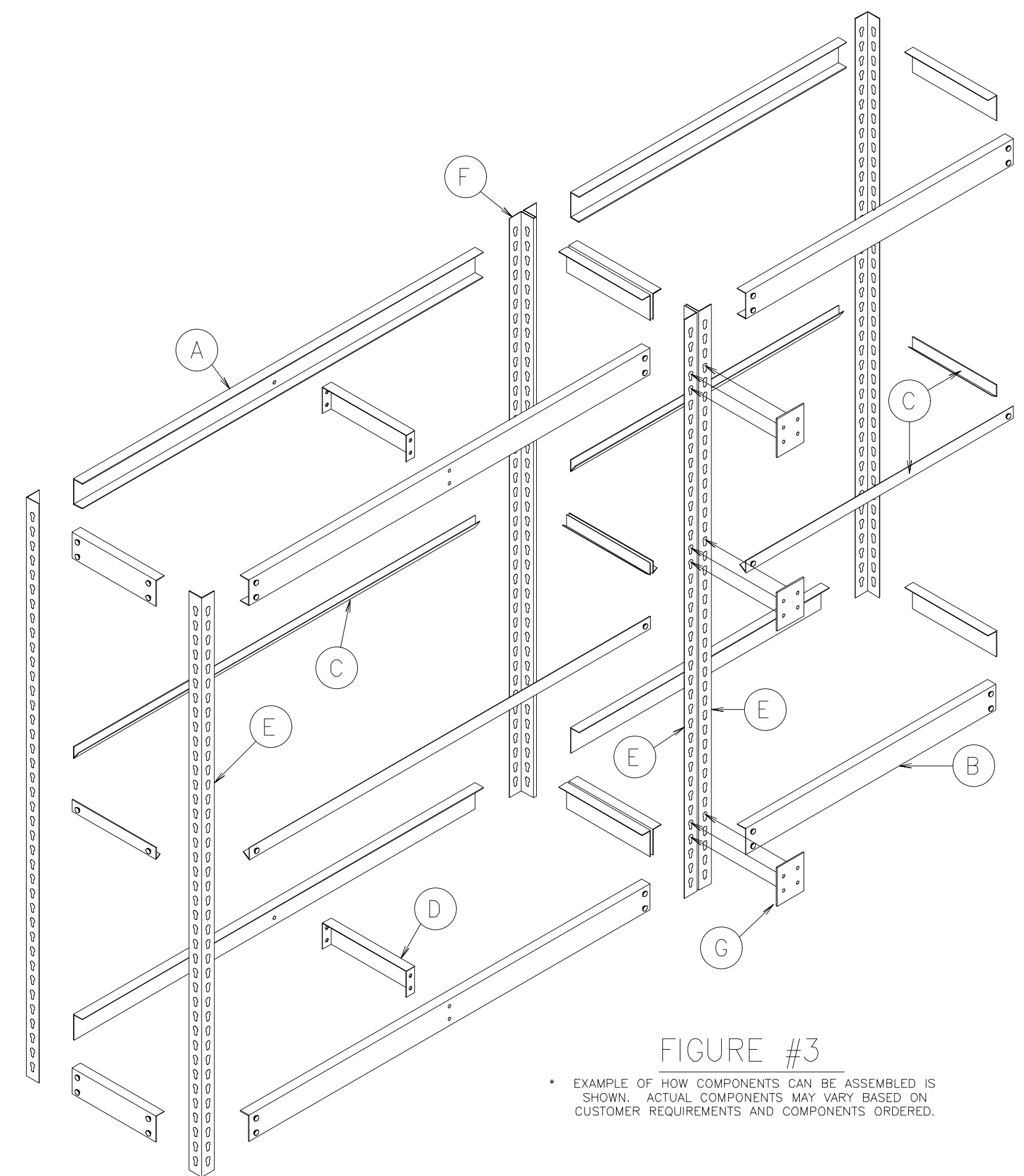
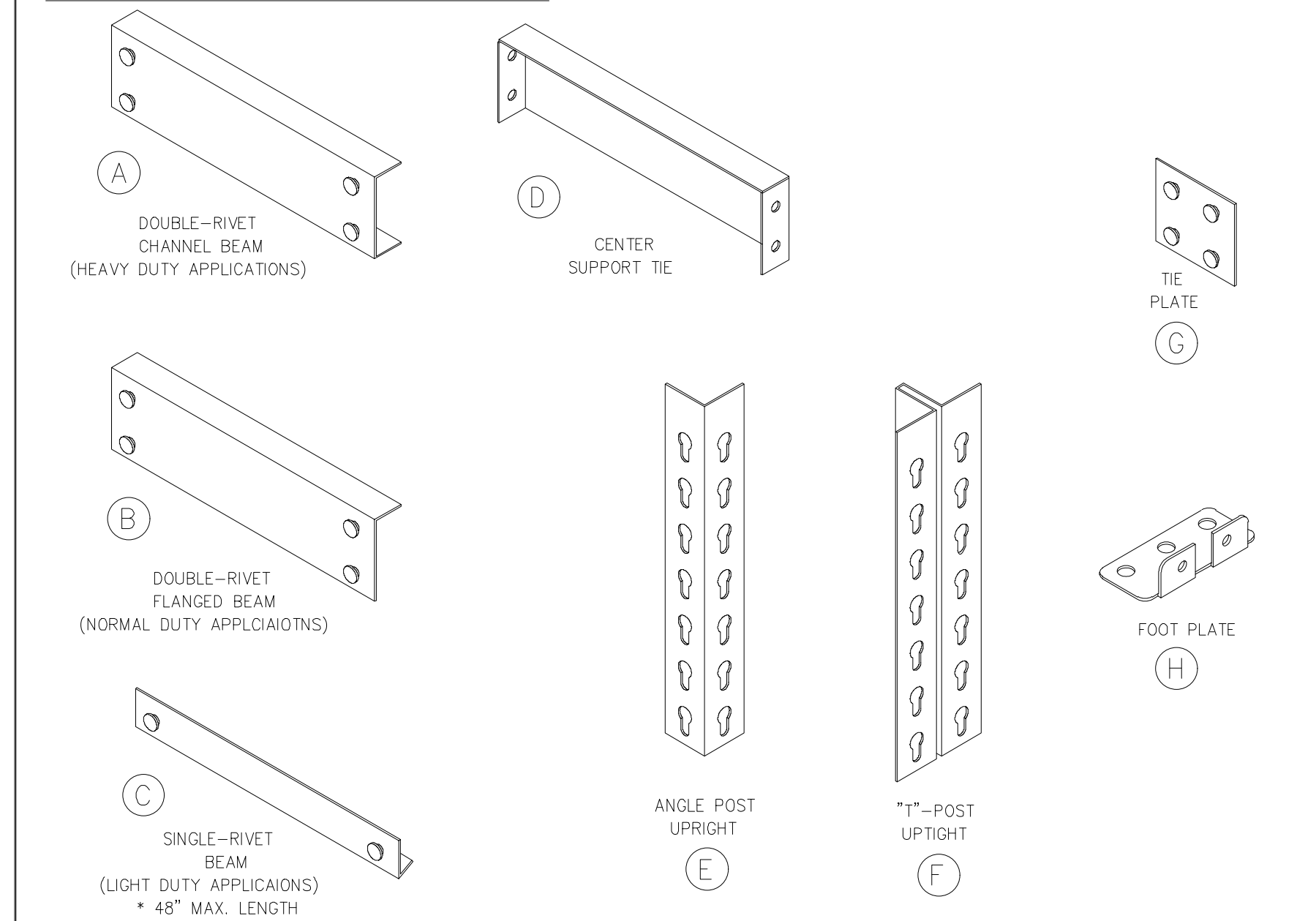


RIVET FOOT PLATE ATTACHMENT

1. ATTACH FOOT PLATE TO ANGLE POST UPRIGHT USE (1) 1/4-20 X 1/2" TRUSS HEAD BOLTS, WASHERS AND NUTS. POSITION FOOT PLATE SO THAT MAJORITY OF THE FOOT PLATE IS BENEATH THE UNIT.
2. ATTACH FOOT PLATE TO "T"-POST UPRIGHT USE (2) 1/4-20 X 1/2" TRUSS HEAD BOLTS, WASHERS AND NUTS.
3. LOWEST BEAM MUST BE INSTALLED IN THE SECOND AND THIRD SLOTS WHEN FOOT PLATES ARE USED.



COMPONENT IDENTIFICATION



FOR CONSTRUCTION

Disclaimer
The drawings provided herein depict approximate measurement for placement of cabinets and equipment. Snap-on makes no representations or warranties relative to any building code requirements. Qualified architects, engineers, general contractors and construction consultants should be retained by the building owner and/or occupant prior to finalizing any construction plans.

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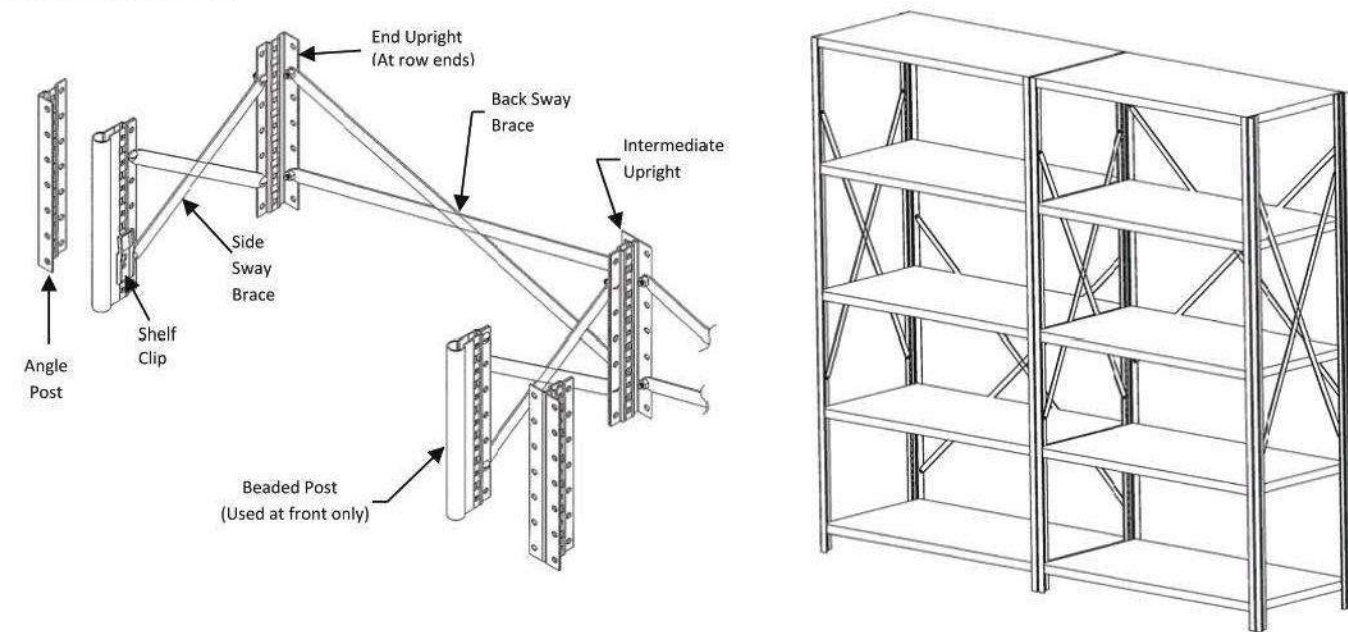
APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Clip Shelving Anchoring BAB 042563

INDUSTRIAL CLIP SHELVING ASSEMBLY INSTRUCTIONS

Page 1

OPEN UNIT ASSEMBLY

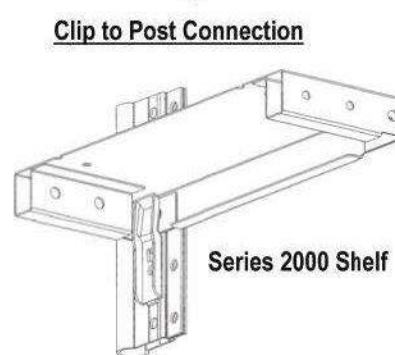


- The first and last uprights in a row of shelving are End Uprights. The remaining uprights in a row are Intermediate Uprights (see assembly graphic above). To build the End Upright, lay the front and rear posts parallel to each other on the floor or saw horses. Position Angle Posts with the 1" flange pointing up. The front post may be Beaded or Angle. The back post is always Angle.

Install Shelf Clips on both posts at the desired shelf locations by inserting the fingers of the clip into the rectangular holes in the post and sliding down until the clip is fully seated. Install the clips for the bottom shelf in the bottom two rectangular holes; install the clips for the top shelf in the top two rectangular holes.

Using a shelf to determine proper spacing of posts, attach a pair of Side Sway Braces to the posts forming an "X" with 1/20 x 5/8" screws and nuts. See page 3 for information regarding sway brace locations. Note: Bolts cannot be placed where shelves are located.

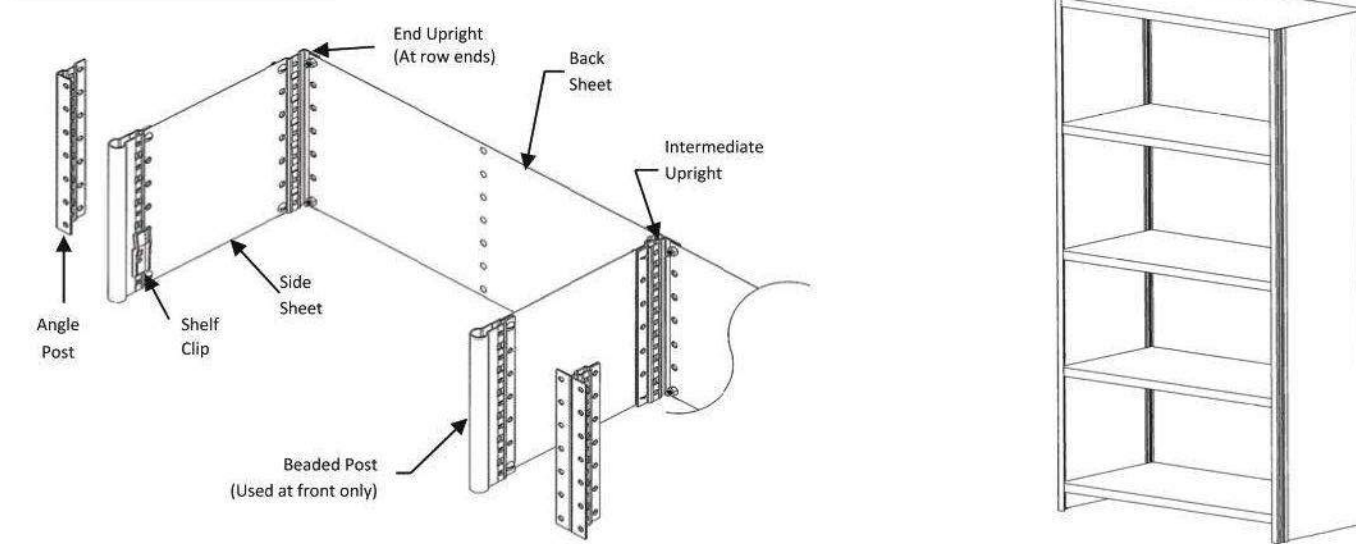
- Intermediate Uprights are built like End Uprights, except Double Angle Posts replace Single Angle Posts (see graphic above). Double Angle Posts are made by bolting two Single Angle Posts together with two 1/20 x 5/8" screws and nuts. Install Shelf Clips on both sides of the post assembly. Attach a pair of Sway Braces to the front and rear posts as in Step 1.
- Stand two End Uprights or an End and Intermediate Upright to build the first unit. Hold the uprights in position and install the top and bottom shelves onto the shelf clips. Make sure shelves are completely seated on the clips by tapping them down with a soft hammer. Repeat this process with the rest of the shelves in the first unit.
- While holding the unit vertical, install a pair of Back Sway Braces in an "X" pattern using 1/20 x 5/8" screws and nuts. Attach the Back Sway Braces on the inside of the rear Angle Posts as shown.
- If building a row of shelving, continue to add units by standing additional upright assemblies and installing shelves and back braces. The last upright in the row of shelving must be an End Upright.
- Back to back (double) rows are built like single rows, except common Back Sway Braces are used. The common braces are installed on the inside of one of the units, with the bolts going through both rear posts of the back to back units. This will securely tie the back to back units together.



INDUSTRIAL CLIP SHELVING ASSEMBLY INSTRUCTIONS

Page 2

CLOSED UNIT ASSEMBLY



- The first and last uprights in a row of shelving are End Uprights. The remaining uprights in a row are Intermediate Uprights (see assembly graphic above). End and Intermediate Uprights are available in welded assemblies or may be built. To build, lay the front and rear post parallel to each other on the floor or saw horses. Position Angle Posts with the 1" flange pointing up. The front post may be Beaded or Angle. The back post is always Angle.

Install Shelf Clips on both posts at the desired shelf locations by inserting the fingers of the clip into the rectangular holes in the post and sliding down until the clip is fully seated. Install the clips for the bottom shelf in the bottom two rectangular holes; install the clips for the top shelf in the top two rectangular holes.

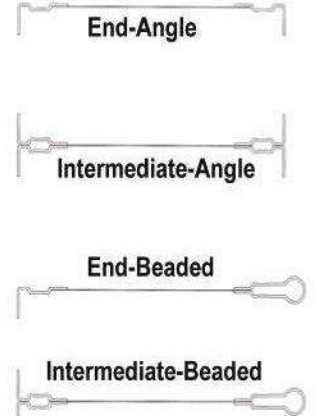
The Upright Side Sheet is attached to the side of the Angle or Beaded post as shown using 1/20 x 5/8" Truss Head screws and nuts. Upright Sheets are supplied with two screws and nuts for every foot of height. Note: Bolts cannot be placed where shelves are located.

- Intermediate Uprights are built like End Uprights, except Double Angle Posts replace Single Angle Posts (see graphic above). Double Angle Posts are made by bolting two Single Angle Posts together with two 1/20 x 5/8" screws and nuts. Install shelf clips on both sides of the post assembly. The Upright Side Sheet is bolted to the side of the Double Angle Posts with 1/20 x 5/8" Truss Head screws and nuts. If a Beaded Post is used, attach the Upright Side Sheet to the side of the Beaded Post with 1/20 x 5/8" Truss Head screws and nuts.
- Stand two End Uprights or an End and Intermediate Upright to build the first unit. Hold the uprights in position and install the top and bottom Shelves on to the shelf clips. Make sure shelves are completely seated on the clips by tapping them down with a soft hammer. Repeat this process with the rest of the shelves in the first unit.
- While holding the unit vertical, install a Back Sheet using 1/20 x 5/8" screws and nuts. Attach the Back Sheet to the inside of the rear angle posts as shown. Slide one edge of the sheet between the shelf and post; then slide the other edge bowing the Back Sheet as needed. Line up the holes in the post with holes in the back and bolt in place using 1/20 x 5/8" Truss Head screws and nuts. Note: Bolts cannot be placed where shelves are located. Bolt backs according to number of bolts and spacing shown below.

Height of Closed Back	Total Number of Bolts and Nuts	Maximum Bolt Spacing
To 3' 11-1/2"	4	46-1/2"
4'1" to 5'11-1/2"	6	36"
6'1" to 7'11-1/2"	8	31-1/2"
8'1" to 9'11-1/2"	10	30"

- If building a row of shelving, continue to add units by standing additional uprights and installing shelves and backs. The last upright in a row is an end upright.
- Back to back (double) rows are built like single rows, except common backs are used. The common Back Sheet is installed on the inside of one of the units, with the bolts going through both rear posts of the back to back units. This will securely tie the back to back units together.

Welded Upright Assemblies - top view



FOOT PLATE DETAIL FOR ALL SINGLE ROW UNITS

INSTALLER NOTES:

- TWO ANCHOR BOLTS REQUIRED FOR ALL FOOT PLATES**
- SHIM FOOT PLATES AS REQUIRED**
- INSTALL ANCHORS IN ACCORDANCE WITH HILTI INSTRUCTIONS 2" MIN. EMBENDMENT**

FOOT PLATE DETAIL FOR ALL DOUBLE ROW UNITS

#1602021 4X6 BASE PLATE ASSEMBLY
 #1621553 3-3/4X5-1/2 11GA SHIM
 #1621552 3-3/4X5-1/2 16GA SHIM
 #703307 1/2-20 X 1 1/4" GRADE 5 HEX HEAD BOLT
 #703625 1/4-20 HEX NUT

INSTALLER NOTE:
 INSTALL ANCHORS IN ACCORDANCE WITH HILTI INSTRUCTIONS 2" MIN. EMBENDMENT REQUIRED.

BEADED POST
 TYPICAL SEISMIC FOOTPLATE ANCHORAGE (2 ANCHORS PER FOOTPLATE)



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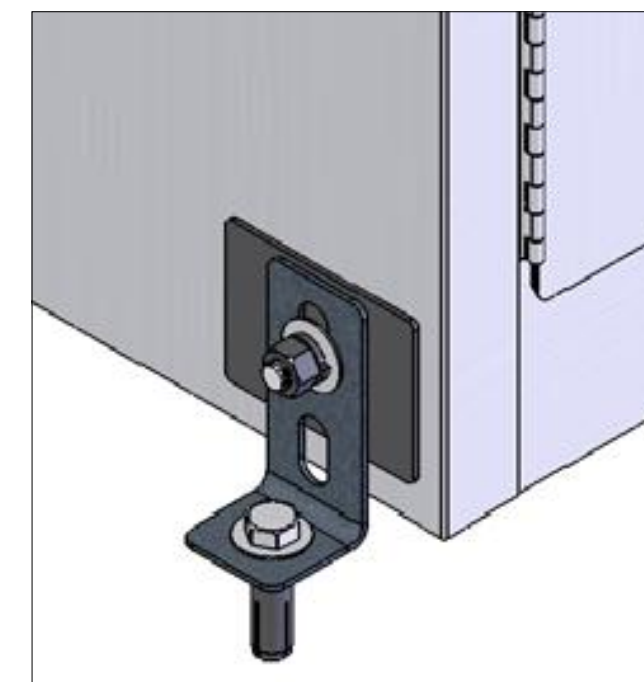
APPENDIX 02 EQUIPMENT FURNISHINGS

College Of Alameda Flammable Cabinets Anchoring BAB 042563

Safety Cabinet Bracket Kit Installation Instructions

Floor Mount Option (see Figure 5)

Note: Due to the variations in concrete construction, the end user is responsible for the installation and use of the concrete anchors. Other fasteners may be more appropriate for your conditions. The included anchors require a minimum concrete thickness of 3". Maximum allowable loading on each anchor is dependent upon the strength of the concrete.



1. Make sure you have leveled the cabinet first with the leg leveler legs provided. For floor seismic anchoring keep the cabinet as low to the floor as possible. Leave enough room between the floor and bottom edge of the cabinet for your open end wrench so, you can make the final level adjustments.
2. Carefully pre-determine the position the SS mounting pad on the cabinet, the floor angle, and concrete angles to give you the best adjustments of the angle when you are ready to assemble. The important key is; the finished installation should not pre-stress the 3M VHB tape. Pre-stressing the 3M VHB can result in the tape not fully curing, adhering, fatiguing and cause eventually failure.
3. Thoroughly clean the side surfaces of the Safety Cabinet with the included alcohol prep pad where the two stainless steel mounting plates will attach to the Safety Cabinet. For best results, the mounting plates should be diagonally opposite (Figure 7). Note: 3M sells 3M VHB Tape adhesion promoters if desirable.
4. Remove the liner from the 3M VHB tape on the mounting plate(*) and firmly press the mounting plate onto the side of the Safety Cabinet in one of the areas previously prepared in step 1. At room temperature, the 3M VHB will reach approximately 50% of the ultimate strength will be achieved after 20 minutes, 90% after 24 hours and 100% after 72 hours. Allow the most amount of time feasible before completing the assembly.
5. Repeat step 2 with the other mounting plate. For best results, the second mounting plate should be located diagonally from the first mounting plate (Figure 7).
6. Attach a stainless steel angle bracket to each mounting plate using one 1/2" fender washer, one 1/2" lock washer, and one 1/2" hex nut .
7. Mark drilling locations onto the floor as necessary. Remove hardware as required to drill and install the concrete anchors into the floor. Use a 5/8" masonry drill bit (not included), and drill 2 1/8" down into the concrete. Clean the debris out of the holes, and gently tap each anchor into each hole until the top of each anchor is flush with the surface of the floor.
8. Replace all hardware and install a 1/2" fender washer and a 1/2" hex bolt through the angle bracket and into the concrete anchor. The bolt securing the bracket to the concrete anchor should be tightened 3-5 turns beyond finger tight. Snug all remaining hardware tight while, avoiding preloading the VHB tape to finish securing the Safety Cabinet.



Figure 7 (Top View)



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COLLEGE OF ALAMEDA
TRANSPORTATION TECHNOLOGY

APPENDIX 03
EXISTING UTILITY SURVEY

Building B

Description

Underground Utilities



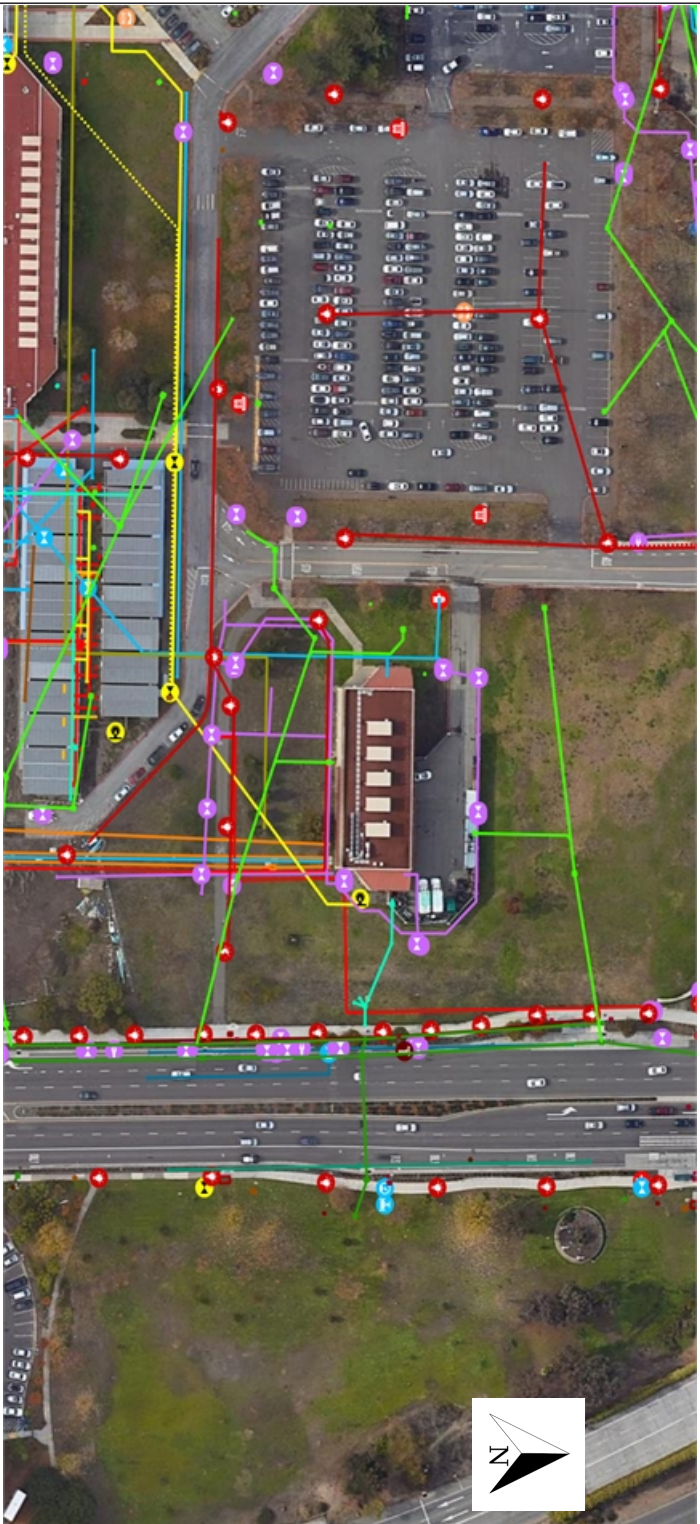
Legend

- Chilled Water
- Communications
- Electric
- Fire Alarm
- Fire Hydrants
- Fire Water
- Gas
- Irrigation
- Lighting
- Other/Unspecified
- Sanitary Sewer
- Storm Drainage
- Water

Building E

Description

Underground Utilities

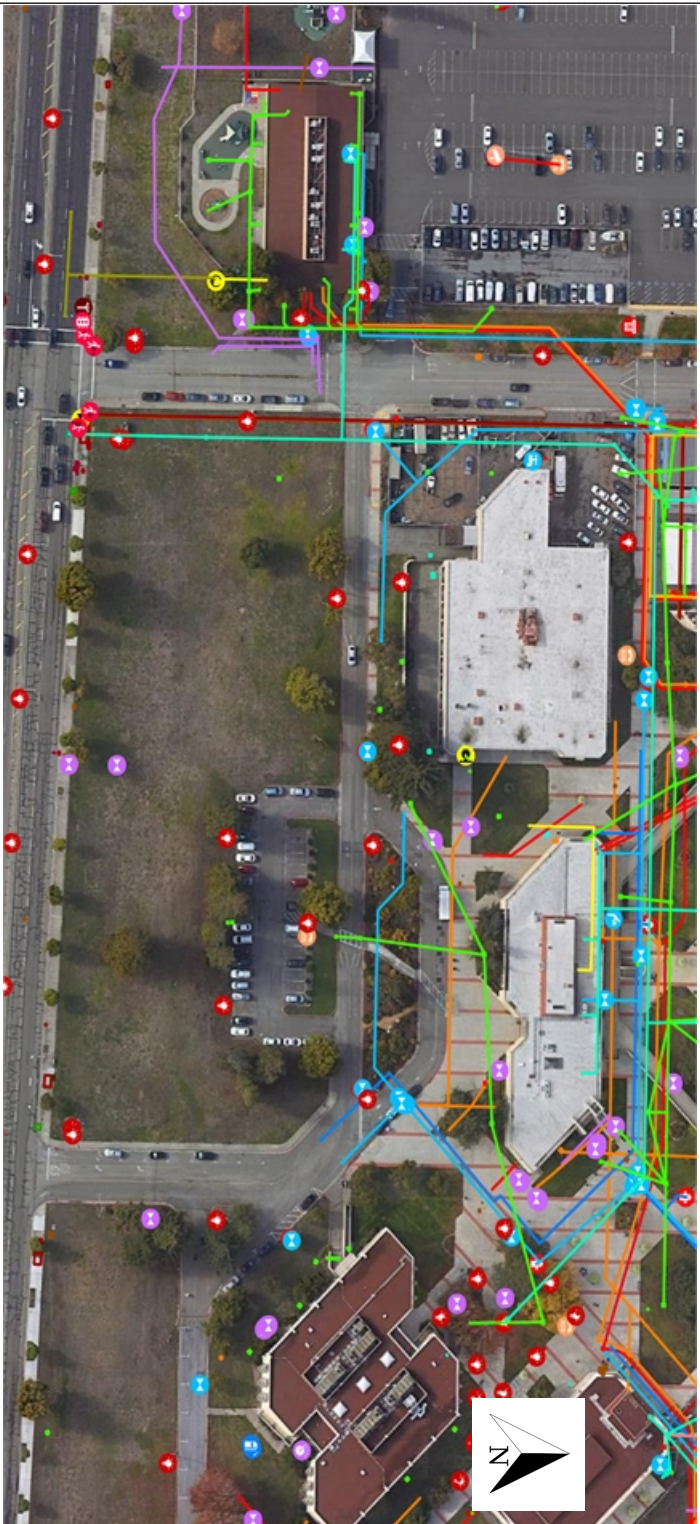


Legend

- Chilled Water
- Communications
- Electric
- Fire Alarm
- Fire Hydrants
- Gas
- Hot Water
- Irrigation
- Lighting
- Other/Unspecified
- Sanitary Sewer
- Storm Drainage
- Traffic/Signal
- Water

NTTC Project Site

Description Underground Utilities



Legend

- Chilled Water
- Communications
- Electric
- Fire Alarm
- Fire Hydrants
- Fire Water
- Gas
- Hot Water
- Irrigation
- Lighting
- Other/Unspecified
- Sanitary Sewer
- Security
- Storm Drainage
- Traffic/Signal
- Water