

**PROJECT
MANUAL**

Curry County Livestock Pavilion
Curry County | Clovis, New Mexico

Project No: 23-0003
Owner's Project No: 2022/23-11



Project Manual

Volume 2 of 3

06/09/2023

100% Construction Documents



SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

1.2 PRODUCT OPTIONS

- A. For products specified by reference standards or by description only, provide any product meeting those standards or description.
- B. For products specified by naming one or more manufacturers with the designation that no substitutions are allowed, provide only named products.
- C. For products specified by naming one or more manufacturers, provide named products and approved substitute products listed in Addenda, or submit a request for substitution in accordance with Paragraph 1. 3.
- D. When a manufacturer's specific product is specified, that product shall be the basis for evaluating substitution requests and establishing requirements for product type, characteristics, performance, and quality.

1.3 SUBSTITUTIONS

- A. During bidding, Architect will consider written requests from qualified bidders, subcontractors, and manufacturers for substitutions.
 - 1. Submit separate request for each substitution with Form 01 2514 - Prior Approval Substitution Request Form. Copy of form follows this Section.
 - 2. Submit substitution request at least 10 calendar days prior to bid opening in accordance with procedures stated in Instructions to Bidders. Request received after that time may not be considered.
 - 3. Substitutions approved during bidding will be listed in Addenda.
- B. After Contract award:
 - 1. After signing of Agreement between Owner and Contractor, Architect will consider written requests for substitutions if one or more of these conditions exist:
 - a. Unavailability of specified products through no fault of Contractor.
 - b. Qualified installer is not available for specified product.
 - c. Substitution is required for compliance with final interpretation of code requirements or insurance regulations.
 - d. Subsequent information discloses inability of specified products to perform properly or to fit in designated space.

- e. refusal of manufacturer to certify or guarantee performance of the specified product as required.
 2. Submit separate request for each substitution with Form 01 2515 - Contractor Substitution Request Form. Copy of form follows this Section. Provide data documenting need for substitution and substantiating compliance of proposed product with Contract Documents. Include proposed changes to contract amount and time if substitution is accepted.
 3. Architect will determine acceptability of proposed substitutions and notify Contractor in writing. Accepted substitutions will be included by Change Order with associated modifications of contract amount and time.
 4. Substitutions will not be considered after contract award if indicated or implied on shop drawings and product data submittals.
- C. Use of approved substitution listed in Addenda or request for substitution after Contract award shall constitute representation that Contractor:
1. Has investigated product and determined it meets or exceeds quality level of specified product.
 2. Will provide same warranty for substitution as for specified product.
 3. Will coordinate installation and make changes to other work required to accommodate accepted substitution and complete Work.
 4. Waives claims for additional costs or time extensions related to substitutions which later become apparent.
- D. Procedure: Submit 3 copies of request for substitution. Limit each request to one proposed substitution. Include in request:
1. Complete data substantiating compliance of proposed substitution with Contract Documents.
 2. For products:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature containing product description, performance and test data, and reference standards.
 - c. Copy of warranty to be provided for proposed substitute product.
 - d. Samples as required.
 3. For construction methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
 4. Itemized comparison of proposed substitution with product specified.
 5. Data relating to changes in construction schedule.

END OF SECTION 01 2500 – FORMS FOLLOWS

PRIOR APPROVAL SUBSTITUTION REQUEST FORM

The undersigned, qualified bidder, subcontractor, manufacturer, or supplier requests that the following product be accepted for use in the Project

PRODUCT: _____

MODEL NO.: _____

MANUFACTURER: _____

ADDRESS: _____

The above product would be used in lieu of

PRODUCT: _____

specified in

SECTION: _____

PARAGRAPH: _____

Attached are the following circled items:

1. Product description including specifications, performance and test data, and applicable reference standards.
2. Drawings.
3. Photographs.
4. Samples.
5. Tabulated comparison with specified product.
6. For items requiring color selections, full range of manufacturer's color samples.
7. Other: _____

The undersigned certifies that the following statements are correct. Explanations for all items

which are **not** true are attached.

- 1. Proposed substitution has been thoroughly investigated and function, appearance, and quality meet or exceed that of specified product. TRUE FALSE
- 2. Same warranty will be provided for substitution as for specified product. TRUE FALSE
- 3. **No** aspect of Project will require re-design. TRUE FALSE
- 4. Use of substitution will **not** adversely affect:
 - a. Dimensions shown on Drawings. TRUE FALSE
 - b. Construction schedule and date of completion. TRUE FALSE
 - c. Work of other trades. TRUE FALSE
- 5. Maintenance service and replacement parts for proposed substitution will be readily available in [Las Cruces] [El Paso] [Roswell] [Albuquerque] [Southern New Mexico] [Northern New Mexico] [_____] area. TRUE FALSE
- 6. Proposed substitution does **not** contain asbestos in any form. TRUE FALSE

Submitted By:

COMPANY: _____

ADDRESS: _____

TELEPHONE NUMBER: _____

NAME OF PERSON SUBMITTING REQUEST: _____

TITLE: _____

DATE: _____

CONTRACTOR SUBSTITUTION REQUEST FORM

The undersigned, as Contractor for the above Project, requests that the following product be accepted for use in the Project

PRODUCT: _____

MODEL NO.: _____

MANUFACTURER: _____

ADDRESS: _____

The above product would be used in lieu of

PRODUCT: _____

specified in

SECTION: _____

PARAGRAPH: _____

Reason for substitution request: _____

Attached are the following circled items:

1. Product description including specifications, performance and test data, and applicable reference standards.
2. Drawings.
3. Photographs.
4. Samples.
5. Tabulated comparison with specified product.
6. For items requiring color selections, full range of manufacturer's color samples.
7. Documentation of reason for request.
8. Cost data for comparing proposed substitution with specified product.

9. Other: _____

The undersigned certifies that the following statements are correct. Explanations for all items which are **not** true are attached.

- 1. Proposed substitution has been thoroughly investigated and function, appearance, and quality meet or exceed that of specified product. TRUE FALSE
- 2. Same warranty will be provided for substitution as for specified product. TRUE FALSE
- 3. **No** aspect of Project will require re-design. TRUE FALSE
- 4. Use of substitution will **not** adversely affect:
 - a. Dimensions shown on Drawings. TRUE FALSE
 - b. Construction schedule and date of completion. TRUE FALSE
 - c. Work of other trades. TRUE FALSE
- 5. Maintenance service and replacement parts for proposed substitution will be readily available in [Las Cruces] [El Paso] [Roswell] [Albuquerque] [Southern New Mexico] [Northern New Mexico] [_____] area. TRUE FALSE
- 6. Proposed substitution does **not** contain asbestos in any form. TRUE FALSE
- 7. All changes to Contract Sum related to use of proposed substitution are included in price listed below. Contractor waives claims for additional costs related to acceptance of substitution which may subsequently become apparent. TRUE FALSE
- 8. Costs of modifying project design caused by use of proposed substitution which subsequently become apparent will be paid for by Contractor. TRUE FALSE

If substitution request is accepted:

Contract Sum will be [decreased] [increased] by \$ _____

Contract Time will be [decreased] [increased] by _____ calendar days.

Submitted By:

CONTRACTOR: _____

ADDRESS: _____

TELEPHONE NUMBER: _____

NAME OF PERSON SUBMITTING REQUEST: _____

TITLE: _____

DATE: _____

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, with Architect's Supplemental Instructions.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 14 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Overhead and profit shall not exceed the following:

Subtotal before applying overhead and profit	Under \$2000	\$2000 to \$10,000	\$10,001 to \$50,000	Over \$50,001
Contractor - For work performed by own forces	18%	16%	14%	12%
Contractor - For subcontracted work.	11%	9%	6%	5%
For work performed by 1 st tier Subcontractor	18%	15%	12%	9%
For work performed by 2 nd tier Subcontractor	10%	8%	5%	4%
Subcontractor - Maximum aggregate O&P allowed over cost regardless of number of	29%	24%	18%	14%

- e. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- f. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Overhead and profit shall not exceed the following:

Subtotal before applying overhead and profit	Under \$2000	\$2000 to \$10,000	\$10,001 to \$50,000	Over \$50,001
Contractor - For work performed by own forces	18%	16%	14%	12%
Contractor - For subcontracted work.	11%	9%	6%	5%
For work performed by 1 st tier Subcontractor	18%	15%	12%	9%
For work performed by 2 nd tier Subcontractor	10%	8%	5%	4%
Subcontractor - Maximum aggregate O&P allowed over cost regardless of number of	29%	24%	18%	14%

6. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
7. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

8. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on Architects Change Order form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 01 2900 - PAYMENT PROCEDURES

1.1 SUMMARY

- A. Section includes:
 - 1. Schedule of Values
 - 2. Application for Payment
- B. Related Requirements:
 - 1. General Conditions of the Contract and Supplementary General Conditions:
 - a. Procedures for Change Orders and calculating cost of Change Orders.
 - b. General procedures for Schedule of Values, Applications for Payment, Certificates for Payment, and Progress Payments.
 - 2. Section 01 2310 – Bid Lots: Bid Lots which increase/decrease scope of Project.
- C. Section 01 3100 - Project Management and Coordination: Progress Schedule.

1.2 SCHEDULE OF VALUES

- A. Submit 5 copies of Schedule of Values within time designated in General Conditions. At request of Architect submit substantiating data.
- B. Submit as typed schedule on standard form or electronic media printout approved by Architect.
- C. Format: Use Project Manual Table of Contents for items. Identify each line item with number and title of corresponding specification section. Provide sufficient detail to allow computation of values for progress payments during construction. Sum of all values shall equal total Contract Sum.
- D. Overhead and profit: Include within each line item a directly proportional amount of Contractor's overhead and profit.
- E. Accepted bid lots: Line item amounts shall include applicable work for bid lots accepted by Owner and included in Contract Sum.
- F. Provide separate line items for:
 - 1. Each Contract modification.
 - 2. Final Project closeout amount: Amount of \$250,000.00 to cover closeout activities and final completion of Project:
 - a. Incomplete items and deficiencies resulting from Final Inspection.
 - 3. Final cleaning and removal of temporary facilities and controls.
 - a. Preparation of project record documents.
 - b. Operation and maintenance manuals, demonstration, and training.
 - c. Closeout submittals.
 - d. Other Project closeout procedures and requirements.
 - 4. Bonds.
 - 5. Insurance.

- 6. New Mexico gross receipts tax.
- G. Revise schedule and resubmit to list as separate line items approved Change Orders

1.3 APPLICATIONS FOR PAYMENT

- A. Submit a copy of each application on Contractor's electronic media driven form or standard form approved by Architect.
- B. Prior to acceptance of each Application for Payment, Architect will review Project Record Drawings specified in Section 01 7800 - Closeout Submittals to ensure that recorded data is current.
- C. Payment period: As stipulated in General Conditions.
- D. Use Schedule of Values for listing items in Applications for Payment.
- E. Line item format: Indicate total amount for each item, percent complete, cost of completed item, cost of materials stored at site for each item, subtotal cost of work complete and materials stored, percent remaining to complete, and cost of items remaining to complete.
- F. Change orders: List each authorized Change Order as a separate line item and in same format as other line items.
- G. Provide subtotals and total for work completed.
- H. New Mexico gross receipts tax: Indicate tax as separate line item followed by total amount of requested payment.
- I. Retainage: Owner will not deduct retainage from payments to Contractor.
- J. Time: Indicate actual and percent of time used and time remaining.
- K. Applications shall be signed by authorized officer of Contractor and dated.
- L. Include with Application for Payment:
 - 1. Appropriate invoices for materials stored off site.
 - 2. Updated Progress Schedule as specified in Section 01 3100 - Project Management and Coordination.
- M. At request of Architect, provide substantiating data justifying dollar amount in question.

END OF SECTION 01 2900

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

1.1 SUMMARY

- A. Section includes:
1. General requirements for coordination of Work.
 2. Field engineering.
 3. Requirements for participation in and administration of:
 - a. Pre-construction conference.
 - b. Progress meetings.
 - c. Progress schedule.
- B. Related documents and sections:
1. Request for Proposal: Pre-proposal Conference.
 2. Section 01 5000 - Temporary Facilities and Controls: Site Mobilization Plan.

1.2 SUBMITTALS

- A. Use of CADD files:
1. Under certain conditions, Contractor will be permitted use of Architect's and Design Consultant's CADD files for documentation of record drawings, submittals, or coordination drawings.
 2. Architect and Design Consultants shall be compensated for time required to format the CADD files for delivery to Contractor. Such work may include removal of title blocks, professional seals, calculations, and proprietary information.
 3. Contractor shall complete Autocad/Revit File Transfer Agreement following this Section, including Contractor's name, address, and signature of Contractor's representative prior to request for CADD file usage. Other Divisions of these specifications may include License, Indemnity and Warranty Agreement forms specific to the design professional responsible for those Divisions, in which case those forms shall be used for drawings prepared by that design professional.
- B. Provide in accordance with Section 01 3300 - Submittal Procedures:
1. Coordination drawings:
 - a. Provide where coordination is critical for installation of components fabricated off site and where space is limited and maximum utilization of space is required.
 - b. Show relationship and integration of components and construction entities, required installation sequence, dimensions, and tolerances.
- C. Staff assignment list: Submit prior to Pre-Construction Conference.
1. List of Contractor's principal staff assignments for Project. Indicate names, duties and responsibilities, addresses, and telephone numbers.
 2. Distribute staff list and post in field office and elsewhere on site as appropriate to provide coordination information.
 3. Project Superintendent: Submit resume showing prior experience as superintendent of projects of similar size and scope. Naming more than one Project Superintendent to be in charge depending upon which is present at site will not be acceptable. Inform Architect in writing prior to any proposed change in Project Superintendent.

1.3 GENERAL COORDINATION PROCEDURES

- A. Scheduling: Coordinate scheduling, submittals, and work of various specification sections to ensure efficient and orderly sequence of installation of interdependent construction elements. Ensure that work of one specification section is not installed in such a manner as to limit, preclude, or restrict work of another section.
- B. Coordinate completion and cleanup of work of separate specification sections in preparation for final inspection specified in Section 01 7700 - Closeout Procedures.
- C. After acceptance of Work, coordinate access to facility for required maintenance, monitoring, adjusting, and correcting deficiencies to manner to minimize disruption of Owner's activities.

1.4 FIELD ENGINEERING

- A. Existing control datum for field engineering is indicated on Drawings.
- B. Locate or establish survey control and reference points prior to starting site construction. Protect points during construction and record locations with horizontal and vertical data on Project Record Documents in accordance with Section 01 7800 - Closeout Submittals.
- C. Prior to start of construction, verify location of control points and layout information on Drawings relative to property, setback, and easement lines.
- D. Provide competent field engineering services. Establish elevations, lines, and levels utilizing recognized engineering survey practices. Periodically verify layouts.
- E. Promptly replace dislocated control and reference points based on original survey control.

1.5 PRE-CONSTRUCTION CONFERENCE

- A. Conference will be held after execution of the Agreement and issuance of Notice To Proceed. Time and location will be designated in Notice To Proceed. Conference will be held at the site or other location convenient to all parties.
- B. Attendance: Owner representative, Architect, consultants, Contractor, Project Superintendent, and major subcontractors and suppliers.
- C. Agenda:
 - 1. Distribution of Contract Documents.
 - 2. Designation and description of roles of responsible personnel representing Owner, Contractor, and Architect.
 - 3. Status of permits and Notice to Proceed.
 - 4. Use of premises by Contractor and Owner.
 - 5. Construction schedule, work sequence, and delivery priorities.
 - 6. Job meeting schedule.
 - 7. Presentation and discussion of Site Mobilization Plan specified in Section 01 5000 - Temporary Facilities and Controls.
 - 8. Construction facilities, controls, and temporary utilities.

9. Procedures for processing submittals, applications for payment, substitution requests, field decisions, communications, and contract modifications.
10. Wage rates.
11. Security, safety, first aid, and housekeeping procedures.
12. Procedures for spotting utility lines.
13. Procedures for maintaining project record documents.
14. Requirements for start up of equipment.
15. Testing and inspection procedures.
16. Inspection and acceptance of equipment put into service during construction period.
17. Contract closeout procedures.
18. Other pertinent items.

1.6 PROGRESS MEETINGS

- A. Schedule and administer construction progress meetings throughout progress of Work. Meetings shall be held bi-weekly or more frequently as required. Location of meetings to be on site or other location approved by Architect.
- B. Make arrangements for meetings, prepare agenda, and distribute notice of meetings to participants, Architect, and Owner 3 days in advance of meeting.
- C. Preside at meetings. Record minutes and distribute copies within 3 days after meeting to participants, entities affected by meeting decisions, Architect, and Owner.
- D. Attendance: Contractor, Job Superintendent, and subcontractors and suppliers as appropriate to agenda. Owner's representative, Architect, and consultants may attend as appropriate.
- E. Prepare agenda to cover topics pertinent to continued progress and successful completion of Work. Suggested topics:
 1. Review previous meeting minutes.
 2. Review schedules and progress, identify impediments, and determine measures to maintain schedules.
 3. Review field observations, problems, and decisions.
 4. Status of submittals.
 5. Off-site fabrication and delivery schedules.
 6. Quality control.
 7. Review proposed change orders and effect on schedule.

1.7 PROGRESS SCHEDULE

- A. Format: Horizontal bar chart:
 1. Approximate sheet size: 24 by 36 inches.
 2. Provide separate bar for each major item of Work. Arrange in sequence and identify bars with specification section numbers and titles from Project Manual Table of Contents.
 3. Horizontal scale: Time with first work day of each month identified. Adjust scale to show entire construction period plus extensions.
 4. Vertical spacing: Allow space for notations and revisions.
- B. Show complete sequence of construction by activity. Indicate:

1. Dates for beginning and completion of each construction item.
2. Projected percentage of completion for each item as of first work day of each month.
3. Projected percentage of completion for total Work as of first day of each month.
4. Required dates for return of specific submittals and for selection of finishes .

C. Procedures:

1. Submit for review by Architect a copy of preliminary Progress Schedule within 20 days of date of Agreement Between Owner and Contractor.
2. Revise to address review comments and resubmit.
3. Update Progress Schedule and submit a copy with each Application for Payment.
 - a. Identify progress of each activity to date of submittal and projected completion date.
 - b. Identify activities modified since previous submittal and other identifiable changes.
 - c. Provide narrative report as needed to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken or proposed and its effect.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Verify utility requirements and characteristics of equipment are compatible with facility utilities. Coordinate work of various specification sections having interdependent requirements for installing, connecting to, and placing in service such equipment

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Space requirements: Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs. Ensure space provided around equipment and fixtures complies with applicable codes.
- B. Arrangement:
1. Unless otherwise indicated, installations shall be aligned vertically and horizontally.
 2. Coordinate mounting heights and spacings of components so that finished work is neat and orderly with organized appearance.
 3. Repetitive items such as hangers and fasteners shall be equally spaced unless indicated otherwise.
- C. Blocking, anchors, and supports: Determine and coordinate requirements for blocking, anchors, and supports needed for proper installation of products. Provide necessary components whether or not indicated on Drawings or specified.
- D. Finished surfaces: Coordinate locations of surface mounted items with finish elements and grades to ensure proper installation and neat appearance.

3.2 COORDINATION WITH INSTALLED CONSTRUCTION

- A. Remove, cut, and patch previously installed construction in a manner to minimize damage and to provide a means of restoring finishes to original or better condition.
- B. Where refinishing is required, provide a neat transition to adjacent surfaces.
- C. Patched work shall match existing adjacent work in texture and appearance.

END OF SECTION

AUTOCAD/REVIT FILE TRANSFER AGREEMENT

THIS AUTOCAD/REVIT FILE TRANSFER AGREEMENT made and entered into this th day of , by **Formative Architecture**, and between **Formative Architecture**, and **REPLACE WITH NAME OF COMPANY**

WITNESSETH

WHEREAS, **REPLACE WITH NAME OF COMPANY** has requested **Formative Architecture** to furnish computer files of the Drawings (“AutoCAD/Revit Files”) in machine readable form to **REPLACE WITH NAME OF COMPANY** for use on projects of Owner, **REPLACE WITH NAME OF OWNER**

WHEREAS, the parties desire to set forth herein the terms of transfer of the AutoCAD/Revit Files and to provide for identification to Formative Architecture in connection therewith:

NOW, THEREFORE, for and in consideration of the foregoing recitals and of the terms and conditions hereafter set forth, the parties do hereby mutually agree as follows:

- 1. **Formative Architecture** shall transfer to **REPLACE WITH NAME OF COMPANY** the AutoCAD/Revit Files of the Drawings without charge. **Formative Architecture** makes no representations, warranties or guarantees as to the correctness, completeness, or propriety of the information contained in the Drawings or in the AutoCAD/Revit Files, or that such AutoCAD/Revit Files are free of computer viruses.
- 2. In consideration of **Formative Architecture**’s transfer of the AutoCAD/Revit Files, **REPLACE WITH NAME OF COMPANY** hereby agrees to assume all risks associated therewith and to indemnify and hold **Formative Architecture** harmless from and against any and all claims asserted by any persons whatsoever, including but not limited to **Owner**, and **REPLACE WITH NAME OF COMPANY** and their respective agents, contractors, or representatives, and any and all liabilities, losses, damages, costs and attorney’s fees in connection therewith, arising in any way from or in connection with:
 - a. use of the AutoCAD/Revit Files in any computers, and
 - b. use of the AutoCAD/Revit Files, the Drawings or the information contained therein in the construction and development of any project.
- 3. All notices required or permitted to be given hereunder shall be sent to the parties by email, facsimile transmission, reliable overnight courier, or by certified mail, return receipt requested and first class postage prepaid at the following address:
Formative Architecture 209 Gold Ave. SW, Albuquerque, New Mexico 87102
REPLACE WITH NAME OF COMPANY PLEASE FILL OUT ADDRESS

All notices sent by certified mail shall be deemed received five (5) days after posting. The partners reserve the right to advise of different addresses or recipients of the above notices.

In the event it becomes necessary for any party hereto to enforce its rights hereunder, then the prevailing party is such enforcement proceedings in addition to any other relief it might be awarded shall be entitled to recover its costs, expenses, and reasonable attorneys fees.

IN WITNESS WHEREOF the parties have set their hands on the date and year first above written.

Formative Architecture

By: _____ Title: _____

REPLACE WITH NAME OF COMPANY

By: _____ Title: _____

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Construction Progress Chart - "S" Curve Diagram.
3. Daily construction reports.
4. Site condition reports.
5. Unusual event reports.

- B. Related Requirements:

1. Section 01 2900 "Payment Procedures" for submitting *Construction Progress Chart - "S" Curve Diagram* with Application for Payment.
2. Section 01 3233 "Photographic Documentation" for periodic construction photographs for documenting the progress of construction during performance of the Work.
3. Section 01 3300 "Submittal Procedures" for submitting schedules and reports.
4. Section 01 4000 "Quality Requirements" for submitting a schedule of tests and inspections.
5. Section 01 7839 "Project Record Documents" for administrative and procedural requirements for project record documents.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:

1. PDF file.
 2. One paper copy for each required original Application for Payment.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- C. Construction Progress Chart - "S" Curve Diagram: Submit with Applications for Payment.
- D. Daily Construction Reports: Submit daily via email.
- E. Site Condition Reports: Submit at time of discovery of differing conditions.
- F. Unusual Event Reports: Submit at time of unusual event.

1.5 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from entities involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 30 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 3300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Owner-Furnished Products: Include a separate activity for each product. Include delivery date. Delivery dates indicated stipulate the earliest possible delivery date.
 2. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction, if applicable.
 - b. Uninterruptible services.
 - c. Use-of-premises restrictions.
 3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Submittals.
 - b. Mockups.
 - c. Fabrication.
 - d. Installation.
 - e. Curing.
 4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule five business days before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting and/or no later than 5 business days.
 2. As the Work progresses, indicate final completion percentage for each activity.

- H. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.7 CONSTRUCTION PROGRESS CHART - "S"-CURVE DIAGRAM

- A. Format:
 - 1. Size: 8-1/2 by 11 inches.
 - 2. Horizontal scale: time with first work day of each month identified. Adjust scale to show entire construction period.
 - 3. Vertical scale: Total percent of work complete ranging from 0 to 100 percent.
 - 4. Plot proposed schedule of completion as base line.
 - 5. Plot actual schedule of completion as comparison to base line. Update monthly by extending actual completion line.
 - 6. Refer to sample *Construction Progress Chart - "S" Curve Diagram* at end of this section.
- B. Submit monthly with each Application for Payment, a copy of the updated *Construction Progress Chart - "S" Curve Diagram* illustrating progress of Work.

1.8 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 15 days of date established for the Notice to Proceed.
 - 1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.9 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.

6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Testing and inspection.
 8. Accidents.
 9. Meetings and significant decisions.
 10. Unusual events.
 11. Stoppages, delays, shortages, and losses.
 12. Meter readings and similar recordings.
 13. Emergency procedures.
 14. Orders and requests of authorities having jurisdiction.
 15. Change Orders received and implemented.
 16. Construction Change Directives received and implemented.
 17. Documenting of Record Document activity.
 18. Services connected and disconnected.
 19. Equipment or system tests and startups.
 20. Partial completions and occupancies.
 21. Substantial Completions authorized.
 22. Digital Photographs.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- C. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner and Architect in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner and Architect within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

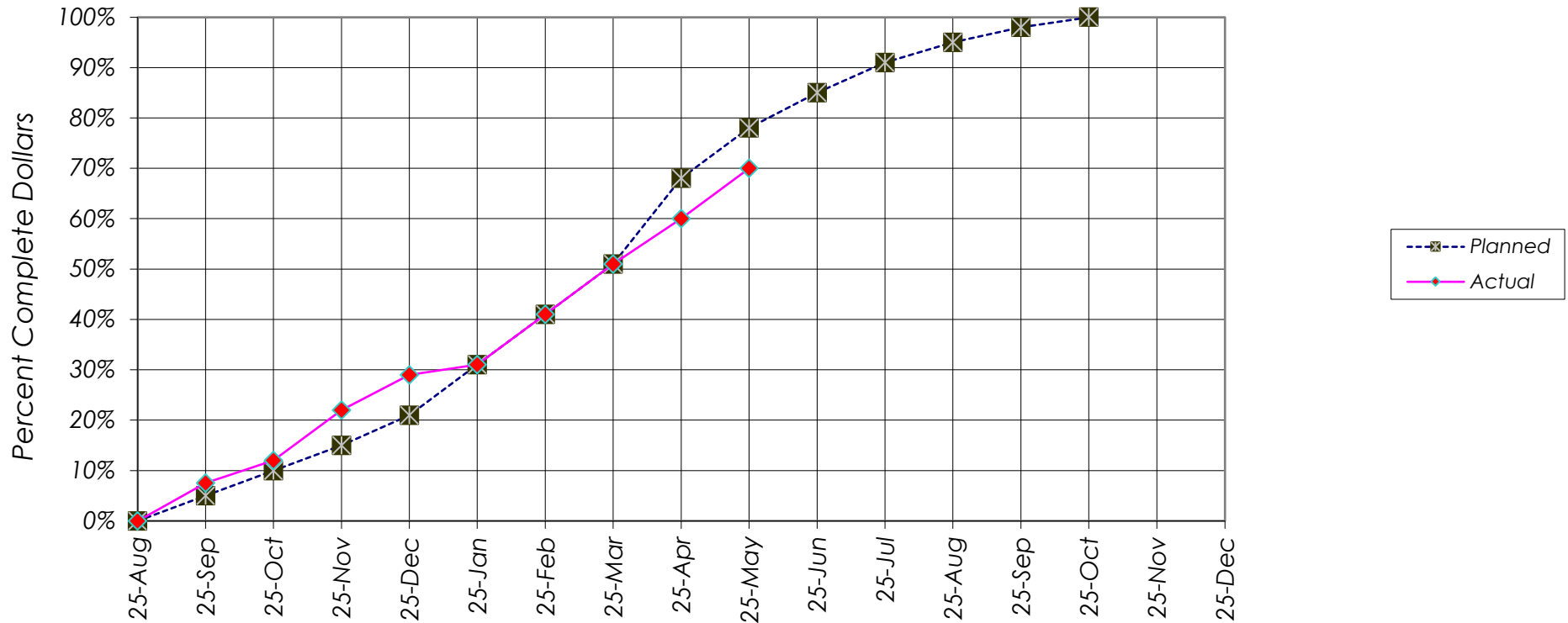
PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3200

CONSTRUCTION PROGRESS CHART
"S" CURVE DIAGRAM



Planned & Actual Percent Complete



Monthly Construction Progress Chart ("S" Curve Diagram)

Project Name: _____

Contractor: _____

Project No: _____

Date: _____

SECTION 01 3233 - PHOTOGRAPHIC DOCUMENTATION**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
- B. Related Requirements:
 - 1. Section 01 7700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 2. Section 01 7900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
 - 3. Section 02 4119 "Selective Demolition" for photographic documentation before selective demolition operations commence.
 - 4. Section 31 1000 "Site Clearing" for photographic documentation before site clearing operations commence.

1.3 INFORMATIONAL SUBMITTALS

- A. Digital Photographs: Image files shall be submitted in conjunction with or as part of the Daily Construction Report; in no case later than three (3) days of taking photographs.
 - 1. Comply with requirements of Section 01 3200 "Construction Progress Documentation" for submission of Daily Constructon Report.
 - 2. Submit photos and Daily Construction Report on CD-ROM, thumb-drive, or by uploading to web-based Project management software site.

1.4 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 121 megapixels, and at an image resolution of not less than 3200 by

2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode with vibration-reduction technology. Provide supplemental lighting in low light levels or backlit conditions.
- C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- D. Metadata: Record accurate date and time and GPS location data from camera.
- E. File Names: Name media files with date and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as follows:
 - 1. Flag excavation areas and construction limits before taking construction photographs.
 - 2. Take photographs to document existing conditions adjacent to property before starting the Work.
 - 3. Take photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underground utilities.
 - 2. Underslab services.
 - 3. Piping.
 - 4. Electrical conduit.
 - 5. Waterproofing and weather-resistant barriers.
- D. Periodic Construction Photographs: Take no less than five (5) photographs daily for inclusion or submission with the Daily Construction Report. Select vantage points to show status of construction and progress since last photographs were taken.
 - 1. Refer to requirements specified in Section 01 3200 "Construction Progress Documentation."

- E. Additional Photographs: Architect may request photographs in addition to periodic photographs specified.
1. In emergency situations, take additional photographs within 24 hours of request.
 2. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs shall be taken at fabrication locations away from Project site.
 - d. Substantial Completion of a major phase or component of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3233

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Shop drawings.
2. Product data.
3. Samples.
4. Manufacturer's instructions.
5. Design data and calculations.
6. Manufacturer's certificates.
7. Reports for testing, inspecting, and demonstrating.

B. Related Document and Sections:

1. General Conditions of the Contract: Contractor's responsibilities regarding submittals.
2. Section 01 2900 - Price and Payment Procedures: Submittal of Schedule of Values and Applications for Payment.
3. Section 01 2500 - Product Substitution Procedures: Submittal of substitution requests.
4. Section 01 3100 - Product Management and Coordination:
 - a. Submittal of Progress Schedule and coordination drawings.
 - b. Requirements for use of Architect's and Design Consultants' electronic CADD files and execution of CADD License, Indemnity, and Warranty Agreement.
5. Section 01 4000 - Quality Requirements: Manufacturers' field services and reports.
6. Section 01 7800 - Closeout Submittals: Submittal of project record drawings, operation and maintenance manuals, warranties, certifications of inspection, extra materials and other closeout submittals.
7. Refer to individual specification sections for unique submittal requirements related to a specific product.

1.2 SUBMITTAL SCHEDULE

A. Procedure:

1. Submit for review by Architect 1 printed copy and 1 PDF electronic file of Submittal Schedule within 20 days of effective date of Agreement Between Owner and Contractor.
2. Revise to address review comments and resubmit.
3. Update Submittal Schedule to reflect change orders, Progress Schedule revisions, and status of individual submittals. Submit 3 copies with each Application for Payment.

B. Format: Arrange the following information in a tabular format:

1. Submittal number and title.
2. Related specification section number and title.

3. Proposed submittal date, actual submittal date, and date reviewed submittal is required.

1.3 SUBMITTAL PROCEDURES

- A. Schedule submittals to expedite Work. Unless otherwise noted, submittals shall be submitted within 45 days of effective date of Agreement between Owner and Contractor.
- B. Preparation:
 1. Provide separate submittal for each specification section requiring submittals. Include all material requested for that section. Provide folders or binders for material.
 2. Coordinate submission of related items. Group submittals of related products or a system in a single transmission.
 3. Coordinate submittals requiring color or pattern selection by Architect. Ensure such submittals are submitted within 45 days of effective date of Agreement between Owner and Contractor. Architect will not make color and pattern selections until all submittals requiring such selections are submitted.
 4. Identify variations from requirements of Contract Documents. State product and system limitations which may adversely affect Work.
 5. Mark or show dimensions and values in same units as specified.
 6. Provide 4 by 6 inch minimum space for Architect and Contractor review stamps.
- C. Contractor review:
 1. Review submittals prior to transmittal. Verify compatibility with field conditions and dimensions, product selections and designations, and conformance of submittal with requirements of Contract Documents. Return non-conforming submittals to preparer for revision rather than submitting to Architect.
 2. Coordinate submittals to avoid conflicts between various items of work.
 3. Apply Contractor's stamp with signature certifying that review, verification of products required, field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the Contract Documents.
 4. Failure of Contractor to review submittals prior to transmittal to Architect shall be cause for rejection.
- D. Transmittal:
 1. Transmit each submittal with a separate Submittal Record Form. Copy of Form follows this Section.
 2. Sequentially number transmittal forms. Resubmittals shall have original number with an alphabetic suffix.
 3. Identify project, Contractor, subcontractor, supplier, pertinent drawing sheet and detail numbers, and associated specification section numbers.
 4. Sign Submittal Transmittal Form and deliver submittals to Architect.
- E. Review: Architect will review and return submittals with comments.
- F. Do not fabricate products or begin work which requires submittals until return of submittal with Architect's acceptance.

- G. On return, promptly distribute reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- H. Resubmission:
 - 1. Revise and resubmit submittals as required within 15 days of return from Architect.
 - 2. Make resubmittals under procedures specified for initial submittals.
 - 3. Identify all changes made since previous submittal.
- I. Use of BIM files: If Architect's and Design Consultants' electronic BIM files are required for preparation of submittal shop drawings, comply with requirements of Section 01 3100 - Product Management and Coordination for use of electronic BIM files and execution of BIM License, Indemnity, and Warranty Agreement.
- J. Architect and Design Consultants will review initial submittal and one resubmittal. If Contractor fails to provide required data with first resubmittal, Contractor shall be charged for Architect's and Design Consultants' time required for review of additional resubmittals at current, standard rates. Charges will be deducted from Contract Sum by Change Order.

1.4 SHOP DRAWINGS

- A. Submission:
 - 1. Submit one reproducible transparency or one paper drawing suitable for photocopying and 3 copies to be retained by Architect. Reproducible shop drawing will be returned to Contractor with annotations.
 - 2. Fold paper drawings to, fit submittal folders.
- B. Form:
 - 1. Size: 8-1 /2 by 11 inches minimum and 36 by 48 inches maximum except for full size details and templates.
 - 2. Present in a clear and thorough manner. Title each drawing with Project name. Identify each element of drawing with reference number.
 - 3. Plans, elevations, sections, and detailed shop drawings shall be to scale with scale indicated.
 - 4. Indicate field verified dimensions. Show relationship of products to adjacent work. Note coordination requirements.
 - 5. Schematics and wiring and other diagrams shall be logically arranged and presented in a clear understandable manner with all items labeled.

1.5 SHOP DRAWINGS

- A. Submission: Submit number of copies which Contractor requires plus 3 copies to be retained by Architect.
- B. Form:

1. Provide all critical information such as reference standards, performance characteristics, capacities, power requirements, wiring and piping diagrams, controls, component parts, finishes, dimensions, and required clearances.
2. Submit only data which are pertinent. Mark each copy of manufacturer's standard printed data to identify products, models, options, and other data pertinent to project.
3. Modify manufacturer's standard schematic drawings and diagrams and supplement standard data to provide specific information applicable to project. Delete information not applicable.
4. Colors and patterns: Unless color and pattern is specified for product, submit accurate color and pattern charts or samples illustrating manufacturer's full range for selection by Architect. Full color range shall be submitted as part of electronic PDF file.

1.6 SAMPLES

A. Submission:

1. Submit the number of samples specified in individual specification sections. One sample will be retained by Architect.
2. Label each sample with identification related to Submittal Transmittal Form.
3. Submit photographs of all samples in electronic PDF format.
4. Submit samples at least 30 days prior to date Contractor needs approval for ordering or incorporation into Work.

B. Type: Submit samples to illustrate functional and aesthetic characteristics of the products, with all integral parts and attachment devices. Include full range of manufacturer's standard finishes, indicating colors, textures, and patterns for Architect's selection.

C. Reviewed product samples may be used in work with approval of Architect.

1.7 MANUFACTURER'S INSTRUCTIONS

A. Submission: Submit number of copies which Contractor requires plus 3 copies to be retained by Architect.

B. Form: All of the following items shall be included in both the electronic PDF file and hard copy.

1. Manufacturers' printed instructions for activities such as delivery, storage, assembly, installation, wiring, start-up, adjusting, finishing, and maintaining.
2. Indicate pertinent portions and identify conflicts between manufacturers' instructions and Contract Documents.

1.8 DESIGN DATA AND CALCULATIONS

A. Submission: Submit number of copies which Contractor requires plus 3 copies to be retained by Architect.

- B. Form: All of the following items shall be included in both the electronic PDF file and hard copy.
 - 1. Provide basic calculations, analyses, and data to support design decisions and demonstrate compliance with specified requirements. State assumptions and define parameters. Give general formulas and references. Provide sketches as required to illustrate design method and application.
 - 2. Arrange calculations and data in a logical manner with suitable text to explain procedure.
 - 3. Indicate name, title, and telephone number of individual performing design and include professional seal of designer where applicable or required.

1.9 MANUFACTURER'S CERTIFICATES

- A. Submission: Submit number of copies which Contractor requires plus 3 copies to be retained by Architect.
- B. Form:
 - 1. Certificates shall indicate that products conform to or exceed specified requirements. Submit supporting reference data, affidavits, and certifications as required.
 - 2. Certificates may be based on recent or previous test results if acceptable to Architect.

1.10 REPORTS

- A. Submission:
 - 1. Submit number of copies which Contractor requires plus 3 copies to be retained by Architect.
 - 2. Submit reports within 15 days after completion of activity.
- B. Form:
 - 1. Present complete information in a clear concise manner.
 - 2. Type or computer print on 8-1/2 by 11 inch white paper.
 - 3. Bind with titled cover in folder, plastic binder, or three-ring binder as appropriate for quantity of material.
- C. Reports shall include: All of the following items shall be included in both the electronic PDF file and hard copy.
 - 1. Time, location, conditions, and duration of activity.
 - 2. Names of persons performing and witnessing activity.
 - 3. Equipment used.
 - 4. Description of activity, data recorded, and results.
 - 5. Deficiencies found, corrective measures, and results of retesting.
 - 6. Other pertinent data.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SUBMITTAL TRANSMITTAL FORM

The undersigned, as Contractor for the above project, submits the following and certifies that submittal has been reviewed and it conforms with requirements of Contract Documents except as noted.

SUBMITTAL NUMBER: _____ RESUBMITTAL: YES NO

DATE: _____ NUMBER OF COPIES SUBMITTED: _____

DESCRIPTION: _____

ASSOCIATED SPECIFICATION SECTION NO: _____

REFERENCED DRAWING SHEET NO: _____

NAME OF SUBCONTRACTOR/SUPPLIER: _____

SUBMITTED

BY: _____ DATE: _____

SIGNATURE: _____

DATE RECEIVED BY DESIGN PROFESSIONAL: _____

DISTRIBUTED TO:

OWNER CIVIL LANDSCAPE STRUCTURAL MECHANICAL ELECTRICAL

OTHER: _____

ACTION: No exceptions taken []
 Make corrections noted []
 Revise and resubmit []
 Rejected []

COMMENTS: _____

Submittal review corrections and comments by Design Professional do not relieve Contractor from compliance with Contract Documents. Review is only for general conformance with design concept and general compliance with information given in Contract Documents. Contractor is responsible for verifying dimensions, selecting fabrication processes and techniques of construction, coordination with other trades, and performing work in safe and satisfactory manner.

REVIEWED BY: _____ DATE: _____

SIGNATURE: _____

SECTION 013516 - ALTERATION PROJECT PROCEDURES

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 special procedures for alteration work.

1.3 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep existing items that are not to be removed or dismantled.

- L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 COORDINATION

- A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.
 - 1. Schedule construction operations in sequence required to obtain best Work results.
 - 2. Coordinate sequence of alteration work activities to accommodate the following:
 - a. Owner's continuing occupancy of portions of existing building/site.
 - b. Owner's partial occupancy of completed Work.
 - c. Other known work in progress.
 - d. Tests and inspections.
 - 3. Detail sequence of alteration work, with start and end dates.
 - 4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
- B. Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Project building(s) and site. Some work is near circulation patterns. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.5 PROJECT MEETINGS FOR ALTERATION WORK

- A. Preliminary Conference for Alteration Work: Before starting alteration work, General Contractor will conduct a conference at Project site.
 - 1. Attendees: In addition to representatives of Owner, Architect, and Contractor, Owner's insurer if required, testing service representative, and specialists.
 - 2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
 - a. Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Fire-prevention plan.
 - c. Governing regulations.
 - d. Areas where existing construction is to remain and the required protection.
 - e. Hauling routes.
 - f. Sequence of alteration work operations.
 - g. Storage, protection, and accounting for salvaged and specially fabricated items.
 - h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
 - i. Qualifications of personnel assigned to alteration work and assigned duties.
 - j. Requirements for extent and quality of work, tolerances, and required clearances.

- k. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.
 3. Reporting: general Contractor will record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at bi-weekly or as required by construction progress. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences. Meetings for other purposes should be scheduled for the same day as the coordination meetings to the greatest extent possible.
1. Attendees: In addition to representatives of Owner, Architect, and Contractor, each specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of alteration work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to alteration work.
 2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
 - a. Alteration Work Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
 - b. Schedule Updating: Revise Contractor's Alteration Work Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each entity present, including review items listed in the "Preliminary Conference for Alteration Work" Paragraph in this article and the following:
 - 1) Interface requirements of alteration work with other Project Work.
 - 2) Status of submittals for alteration work.
 - 3) Access to alteration work locations.
 - 4) Effectiveness of fire-prevention plan.
 - 5) Quality and work standards of alteration work.
 - 6) Change Orders for alteration work.
 - 7) Owners operational needs and coordination of relocating staff and students.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.
 - 1. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed.

1.7 INFORMATIONAL SUBMITTALS

- A. Alteration Work Subschedule:
 - 1. Submit alteration work subschedule within 45 days of date established for commencement of alteration work
- B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.
- C. Alteration Work Program: Submit 30 days before work begins.
- D. Fire-Prevention Plan: Submit 30 days before work begins.

1.8 QUALITY ASSURANCE

- A. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.
 - 1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
 - 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- B. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- C. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.9 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials:

1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

B. Salvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.

E. Storage Space:

1. Owner will arrange for limited on-site location(s) for free storage of salvaged material. This storage space does not include security and climate control for stored material.
2. Arrange for off-site locations for storage and protection of salvaged material that cannot be stored and protected on-site.

1.10 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of preconstruction photographs and preconstruction videotapes.

1. Comply with requirements specified in Section 01 3233 "Photographic Documentation."

- B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
 - 1. Use only proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes.
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
 - 5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
 - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
 - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
 - 8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building if required.
- B. Temporary Protection of Materials to Remain:
 - 1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
 - 2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.
- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
 - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
 - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
 - 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
 - 1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
 - 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- F. Existing Roofing: Prior to the start of work in an area, install roofing protection as required by roofing warranty provided where required.

3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
 - 1. Comply with NFPA 241 requirements unless otherwise indicated.
 - 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
 - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
 - 1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
 - 2. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
 - 3. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
 - 4. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 - 5. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

- D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
 - 1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.
- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.
- B. Ensure that supervisory personnel are present when work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation **photographs or video recordings**. Comply with requirements in Section 01 3233 "Photographic Documentation."
- D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.

END OF SECTION

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL**1.1 SUMMARY**

A. Section includes:

1. Installation quality control.
2. Reference standards.
3. Mock-ups.
4. Field samples.
5. Inspection and testing laboratory services.
6. Manufacturer's field services and reports.

B. Related requirements:

1. Section 01 3100 – Project Management and Coordination: Requirements for coordination with Owner's separate contractors.
2. Section 23 0593 - Testing, Adjusting, and Balancing: Testing and balancing of HVAC system to be paid for by Owner.
3. Section 23 0500 – Common Work Results for HVAC: Contractor's Submittals; Approvals, Records, and As-Built Drawings.

1.2 INSPECTION AND TESTING LABORATORY SERVICES

A. Unless required otherwise in the Contract, Owner shall appoint, employ, and pay for services of an independent firm to perform routine inspections and compliance for:

1. Test, Adjust, and Balance HVAC system and controls as specified in Section 23 0593 - Testing, Adjusting, and Balancing.
2. Other materials, components, and systems where routine testing to determine compliance with Contract Documents is required.

B. Testing firm shall perform inspections, tests, and other services specified in individual specification sections and as required.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1SUMMARY

A. Section includes:

1. Site mobilization plan.
2. Temporary services: Electrical, lighting, heating, ventilating, water, telephone, and facsimile.
3. Fencing, barriers, and other temporary controls.
4. Temporary erosion and sediment controls including NPDES-SWPPP requirements.
5. Construction facilities: Temporary buildings, sanitary facilities, access, and parking.
6. Protection of Work and existing facilities.
7. Project sign.
8. Bulletin board.

B. Related documents and sections:

1. Section 01 3100: Project Management and Coordination
2. Section 01 7000 - Execution Requirements: Progress cleaning.

1.2REFERENCES

- A. NFPA 10 - Standard for Portable Fire Extinguishers.
- B. NFPA 241 - Safeguarding Building Construction, Alterations, and Demolition Operations.

1.3SITE MOBILIZATION PLAN

- A. Coordinate locations for temporary facilities with Design Professional and Owner.
- B. Based upon information indicated on Drawings, prepare site mobilization.

- C. Present 3 copies of plan at Pre-Construction Conference in accordance with Section 01 3100 - Project Management and Coordination.
- D. Prior to mobilization, revise and resubmit to Design Professional site mobilization plan incorporating final revisions made at Pre-Construction Conference and approved by Design Professional and Owner.

1.4TEMPORARY ELECTRICITY

- A. Connect to existing power source at site. Do not disrupt Owner's need for continuous service. Provide service disconnect and overcurrent protection. Provide temporary feeder as required. Owner will pay cost of electricity used. Exercise measures to conserve power.
- B. Provide power outlets for construction operations with branch wiring, distribution boxes, and flexible power cords as required.
- C. Provide power outlets for construction operations with branch wiring, distribution boxes, and flexible power cords as required.
- D. Permanent convenience receptacles may be utilized during construction.

1.5TEMPORARY LIGHTING

- A. Provide lighting for construction operations. Lighting levels shall be appropriate for type and difficulty of work. Use these minimums as guidelines:
- B. After dark, provide security lighting for interior and exterior work and storage areas.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- D. Maintain lighting and provide routine repairs.
- E. Permanent building lighting may be utilized during construction. Document existing lighting system conditions at start of Work and submit report to Design Professional for approval before Work begins. Re-lamp, replace, or repair existing fixtures at end of job to return lighting to conditions documented prior to commencement of Work.

1.6TEMPORARY HEATING AND VENTILATING

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, and gases.

- B. Provide temporary fan units to maintain clean air for construction operations.
- C. Maintain minimum ambient temperature of 50 degrees F in interior areas where construction is in progress.
- D. Change all HVAC filters in existing system serving area of Work at end of Project.

1.7TEMPORARY WATER SERVICE

- A. Connect to existing water source at site for construction operations. Owner will pay cost of water used. Exercise measures to conserve water.

1.8COMMUNICATIONS

- A. Provide, maintain, and pay for telephone service to field office. Owners telephones will not be available to Contractor's workforce unless for an emergency.
- B. Provide, maintain, and pay for facsimile service to field office.
- C. Provide, maintain, and pay for internet service.

1.9FENCING

- A. Provide temporary fencing around building and materials storage site. Completely separate construction from existing facilities, student pathways and related exterior areas.
- B. Type: Panelized 6 foot high commercial grade chain link fence. Equip with vehicular and pedestrian gates with locks.

1.10 BARRIERS AND PROTECTION

- A. Security: Provide to protect Work and existing facilities from unauthorized entry, vandalism, and theft. Coordinate with Owner's security program and personnel.
- B. Barriers: Provide to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from construction operations.
- C. Barricades and covered walkways: As required by Design Professional, Owner and governing authorities for safe public access to existing buildings.
- D. Enclosures: Provide temporary, insulated, weather tight closures of exterior openings to provide acceptable working conditions, protect Work, and prevent unauthorized ent

- ry. Fit with lockable doors.
- E. Temporary partitions: Provide to separate work areas from existing building at point of connection. Prevent penetration of dust and moisture into existing & completed portions of building.
 - F. Emergency exits shall be maintained during construction. Provide separate barriers as appropriate.
 - G. Protect existing detection devices such as smoke detectors and sensors from construction dust.
 - H. Protect existing trees and plants designated to remain. Replace damaged plant material.
 - I. Hand-water existing trees, plants and grass as necessary to maintain them viable in the event that existing irrigation system is made temporarily inoperable due to the Work. Replace dead plant material as required in the event of failure to comply with this provision.

1.11 PROTECTION OF EXISTING AND INSTALLED WORK

- A. Protect installed Work. Control activity in immediate work area.
- B. Provide temporary and removable protection for installed products.
- C. Protect finished floors, stairs, roofs, and other surfaces from traffic, dirt, wear, and movement of heavy objects with durable sheet materials.
- D. Prohibit traffic and storage on roof surfaces and landscaped areas.

1.12 TEMPORARY FIRE PROTECTION

- A. Install and maintain temporary fire protection components. Establish and follow procedures to protect against fire losses. Comply with NFPA 241.
- B. Fire extinguishers: Provide hand carried, portable, UL rated fire extinguishers of type and size recommended by NFPA 10 for building exposure conditions. Place in accessible, convenient locations in clear view with a minimum of one extinguisher per floor.
- C. Access: Maintain unobstructed access to fire hydrants, water supply, fire extinguishers, stairways, and access routes for fighting fires.

- D. Heating devices: Exercise care and monitor use of temporary heaters to minimize fire risk.
- E. Store combustible materials in fire-safe containers.
- F. Volatile products: Do not store paints, varnishes, paint removers, solvents, adhesives, cleaning rags, and other volatile products in building. Take precautionary measures to prevent fire hazards and spontaneous combustion.
- G. Cutting and welding: Approve in advance use of open flame cutting, welding, and soldering equipment. Ensure that safe conditions exist before granting approval.

1.13 TEMPORARY EROSION AND SEDIMENT CONTROLS

- A. Prevent temporary collection of sediment on sidewalks, parking lots, streets and driveways. Clean such surfaces promptly if such conditions exist due to the Work.
- B. National Pollution Discharge Elimination System (NPDES) permit and procedures for preparing a Storm Water Pollution Prevention Plan (SWPPP).
 - 1. Contractor shall determine whether Project requires an EPA NPDES storm water discharge permit in conformance with all regulations governing the disturbance of construction site areas.
 - 2. If storm water discharge permit is required, then both Contractor and Owner shall be designated as separate permittees and the Contractor shall do the following:
 - a. Prepare a Storm Water Pollution Prevention Plan (SWPPP) document as necessary to ensure compliance with any and all NPDES construction storm water permitting plan requirements.
 - b. Prepare and submit all EPA documentation and forms required of Contractor for permit.
 - c. Assist Owner with preparation and submittal of all EPA documentation and forms specifically required of Owner for permit. Provide all required project-related information to Owner as necessary.
 - d. At Final Completion of Project, Contractor shall complete and submit documentation to EPA as required and to Design Professional as part of Project Closeout documentation package. See Section 01 7800 of Specifications.

3. If a storm water discharge permit is not required, then the Contractor shall submit to the Design Professional and Owner prior to mobilization a signed statement containing specific written justification why such permit is not required on the Project.
4. The Contractor shall manage the discharge of storm water from the site in accordance with NPDES permit and the provisions of the SWPPP. The Contractor shall be responsible for installing and maintaining any necessary storm water control measures in accordance with control device manufacturer's recommendations and the provisions of the SWPPP. The Contractor shall monitor the suitability of the designated control measures and management practices to achieve the storm water quality provisions of the NPDES permit, and shall make any necessary changes to the controls and practices in order to meet the permit requirements. The Contractor shall be responsible for updating the SWPPP and maintaining all records related to the SWPPP. A copy of the approved SWPPP shall be kept on the jobsite at all times. Contractor shall be liable for all fines and construction delays resulting from any governmental agency enforcement action due to failure by the Contractor to satisfy the above requirements.
5. Contractor is responsible for payment of all applicable fees and permits related to SWPPP approval process and for full cost of control measures for the Project.

1.14 ACCESS

- A. Refer to Drawings AS5.3 for designated area of construction. Location of acceptable staging area, access routes and site entrances will be coordinated with the Owner. Protect existing curbs and walks traversed by construction vehicles from damage.
- B. Identify access to Contractor's work and office area with appropriate signs so that delivery personnel and others may contact Contractor. Event Center shall not be used as destination for Contractor's deliveries.
- C. Prevent unauthorized personnel from accessing any other buildings or site through Contractor's work area.

1.15 FIELD FACILITIES

- A. Provide and maintain a weathertight, fully equipped field office.
- B. Provide space for project meetings with table and chairs to accommodate 6 persons.
- B. Provide and maintain storage sheds and other facilities as required.
- C. Arrange for parking for work force in manner approved by Owner. Do not limit Own

er's requirements for parking.

1.16 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required sanitary facilities for work force.
- B. New and existing toilet facilities shall not be used by work force.

1.17 DRINKING WATER

- A. Provide independent source of drinking water for workforce. Owner's drinking fountains shall not be routinely available for Contractor's use.

1.18 PROJECT SIGNS

- A. Construction Sign.
 - 1. Furnish project sign and erect on site at location designated by Design Professional.
 - 2. Construction: 8'-0" wide by 4'-0" tall banner with perforated material or slits for wind.
 - 3. Sign shall be printed at a reprographics house on a flexible substrate with UV protection
 - 4. Design, style and sizes of lettering, color, and text shall be as provided by Design Professional.
 - 6. Allow no other signs to be displayed without approval of Design Professional or as required by Owner.

1.18 BULLETIN BOARD

- A. Furnish and maintain bulletin board adjacent to field office. Display the following throughout construction period:
 - 2. State wage rates.
 - 3. Safety requirements.
 - 4. Official notices and announcements.

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary above grade and buried utilities, equipment, facilities, and excess materials prior to final inspection.
- B. Clean and repair damage caused by installation of temporary facilities.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 5000

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

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 general protection of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Requirements:
 - 1. Section 01 5000 "Temporary Facilities and Controls" for temporary site fencing.
 - 2. Section 31 1000 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by **a diameter tape or the average of the smallest and largest diameters** at a height 6 inches (150 mm) above the ground for trees up to and including 4-inch (100-mm) size at this height and as measured at a height of 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.
- B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and **defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.**
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of the following:
 - 1. Protection-Zone Fencing: Assembled Samples of **manufacturer's standard size made from full-size components.**
 - 2. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
1. Use sufficiently detailed photographs or video recordings.
 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.6 QUALITY ASSURANCE

- A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

1.7 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
1. Storage of construction materials, debris, or excavated material.
 2. Moving or parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Protection-Zone Fencing: Fencing fixed in position and meeting **one of** the following requirements: **Previously used materials may be used when approved by Architect.**
1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and weighing a minimum of 0.4 lb/ft. (0.6 kg/m); remaining flexible from minus 60 to plus 200 deg F (minus 16 to plus 93 deg C); inert to most chemicals and acids; minimum tensile yield strength of 2000 psi (13.8 MPa) and ultimate tensile strength of 2680 psi (18.5 MPa); secured with plastic bands or galvanized-steel or stainless-steel

wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches (2400 mm) apart.

- a. Height: **48 inches**
 - b. Color: High-visibility orange, nonfading.
- B. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:
1. Size and Text: Caution Tree-Protection Zone
 2. Lettering: **3-inch** high minimum, **black** characters on **white** background.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones **before materials or equipment are brought on the site and construction operations begin** in a manner that will prevent people **and animals** from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign for every protection-zone fencing.
- C. Maintain protection zones free of weeds and trash.
- D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.3 EXCAVATION

- A. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

3.4 ROOT PRUNING

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
3. Cover exposed roots with burlap and water regularly.
4. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

3.5 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.
 1. Submit details of proposed pruning and repairs.
 2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than **25** dead or in an unhealthy condition **before the end of the corrections period** or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
 1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures **6 inches** or smaller in caliper size.
 2. Large Trees: Provide **two** new tree(s) of **6-inch** caliper size for each tree being replaced that measures more than **6 inches**.
 - a. Species: match existing

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 01 5639

SECTION 01 6000 - PRODUCT REQUIREMENTS**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 01 1000 "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Section 01 2500 "Substitution Procedures" for requests for substitutions.
 - 3. Section 01 4000 "Quality Requirements" for establishing date of commencement of Warranties.
 - 4. Section 01 4200 "References" for applicable industry standards for products specified.
 - 5. Section 01 7700 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved by Architect through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

- B. **Basis-of-Design Product Specification:** A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
 - 1. **Evaluation of Comparable Products:** In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. **Subject to Compliance with Requirements:** Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. **Comparable Product Request Submittal:** An action submittal requesting consideration of a comparable product, including the following information:
 - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
 - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. **Basis-of-Design Product Specification Submittal:** An action submittal complying with requirements in Section 01 3300 "Submittal Procedures."
- F. **Substitution:** Refer to Section 01 2500 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

- A. **Compatibility of Options:** If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. **Resolution of Compatibility Disputes between Multiple Contractors:**
 - a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.

- b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
 3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.
- B. Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following: "
 2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following: "
 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

- a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following: "
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: "
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following: "
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: "
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 2500 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 2500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 01 3300 "Submittal Procedures."
 1. Form of Approval of Submittal: As specified in Section 01 3300 "Submittal Procedures."
 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

SECTION 01 7000 - EXECUTION REQUIREMENTS

PART 1 - GENERAL**1.1 SUMMARY**

A. Section includes:

1. Basic requirements for examination, preparation and installation.
2. Requirements and limitations for cutting and patching incidental to work, including excavation and backfilling, and as required making several parts fit together.
3. Progress cleaning.

B. Related documents and sections:

1. Section 01 5000 - Temporary Facilities and Controls: Temporary barriers and enclosures.
2. Section 01 7700 - Closeout Procedures: Final cleaning.
3. Section 02 4119 - Selective Demolition: Minor demolition required to accommodate new construction and renovation.
4. Section 07 9200 - Joint Protection: Sealing of conduits, piping, and other items penetrating structure.

1.2 LOCATION OF UNDERGROUND UTILITIES

- A. The Contractor shall arrange for all spotting of lines by utility companies in advance of any excavation work.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Patching and replacement materials: Those used for original installation.
- B. Product substitutions: For any proposed change in patching materials, submit request for substitution in accordance with Section 01 6500 - Substitution Procedures.

PART 3 - EXECUTION

3.1 ROOF PENETRATIONS

A. New roofing:

1. Coordinate, locate and schedule roof penetrations prior to installation of new roof system.
2. Coordinate roof penetrations such that installation does not void roof warranty.

- B. Existing roofing: Prior to penetrating, cutting, and patching existing roofing, verify with Owner if roof is under warranty. If warranted, employ roof contractor certified by manufacturer of roof system, make required inspections and notifications, and perform cutting and patching as required to ensure warranty is not violated. Protect building interior during operations and return roof to weathertight condition after the work is performed.

END OF SECTION

SECTION 01 7500 - STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: General procedures for starting, monitoring, and adjusting items of equipment and complete systems.
- B. Related sections:
 - 1. Section 01 3300 – Submittal Procedures: HVAC & Controls Construction Checklists.
 - 2. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals
 - 3. Section 23 0593 - Testing, Adjusting, and Balancing: Balancing of HVAC system.

PART 2- PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 STARTING OF SYSTEMS

- A. Submit written Construction Checklists in accordance with Section 01 3300 - Submittal Procedures that equipment and systems have been properly installed and are functioning correctly.

END OF SECTION 01 7500

SECTION 01 7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Closeout procedures.
2. Final cleaning.
3. Final inspection.
4. Inspection held immediately prior to end of one year correction period.

B. Related documents and sections:

1. Section 01 7000 - Execution Requirements: Progress cleaning.
2. Section 01 7500 – Starting and Adjusting: Starting and adjusting items of equipment and complete systems.
3. Section 01 7800 - Closeout Submittals: Submittal of project record documents, operation and maintenance manuals, warranties, certificates of inspection, extra materials, and keys.
4. Section 01 7900 – Demonstration and Training: Demonstrations and training for Owner's personnel.

1.2 SUBSTANTIAL COMPLETION PROCEDURES

- A. Prior to or in conjunction with submission of Contractor's request for Substantial Completion, submit the items specified in Section 01 7800 - Closeout Procedures:

1.3 FINAL CLEANING

- A. Execute final cleaning prior to final inspection by methods and with materials and equipment suitable for commercial/institutional building maintenance.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01 7700

SECTION 01 7800 - CLOSEOUT SUBMITTALS

PART 1 – GENERAL**1.1SUMMARY**

- A. Section includes procedures for preparing and submitting closeout submittals:
1. Project Record Documents.
 2. Operation and maintenance manuals and data.
 3. Warranties.
 4. Insurance information.
 5. Certificates of inspection and compliance.
 6. Maintenance tools.
 7. Extra materials.
 8. Keys.
- B. Related documents and sections:
- 1 Section 01 3300 - Submittal Procedures: Submittal of shop drawings, product data, samples, installation instruction, reports and other submittals during construction prior to closeout.
 - 2 Section 01 7500 – Starting and Adjusting: Starting and adjusting items of equipment and complete systems.
 - 3 Section 01 7700 – Closeout Procedures: Requirements for achieving Substantial Completion and Final Completion.

1.2OPERATION AND MAINTENANCE DATA

- A. Provide operation and maintenance data as indicated in the individual specification sections.
- B. Provide written sequence of operations for each automated building system, including those related to the following:
1. Life safety system(s).

2. Electrical system(s).
3. Mechanical system(s).
4. Other automated building systems and components.

C. Submission:

1. Submit data to Design Professional in one or more binders.
2. Submit for review one draft copy 30 days prior to need date or as otherwise specified. This copy will be returned after review with Design Professional's comments. Revise content as required.
3. Once approved, submit copies of final operation and maintenance manuals as follows:
 - a. Two (2) hard copies and two (2) electronic USB thumb drives of entire manual to District.
4. All manuals shall be submitted prior to or in conjunction with Contractor's request for Substantial Completion and prior to demonstration and training session.

D. Contents:

1. Appropriate design criteria.
2. Equipment parts list.
3. Equipment inventory data (on Owner-provided electronic forms) and parts lists.
4. Roofing data (on Owner-provided electronic forms).
5. Operating instructions.
6. Maintenance instruction for equipment and finishes.
7. Shop drawings and product data.
8. Written sequence of operations for each automated building system including those related to the following:
 - a. Life safety system(s).

- b. Electrical system(s).
 - c. Mechanical system(s).
- 9. Testing, balancing, and other field quality reports.
 - 10. Copies of warranties.
 - 11. Directory listings
 - 12. Other material and information as indicated in individual specification sections and as necessary for operation and maintenance by Owner's personnel.
- E. Form:
- 1. Hard copies of manuals shall be 8-1/2 x 11 inch text pages bound in three ring expansion binders with a hard durable plastic cover. All documents to be originals unless otherwise noted.
 - 2. Prepare binder covers with printed subject title of manual, title of project, date, and volume number when multiple binders are required. Printing shall be on face and spine.
 - 3. Internally subdivide the binder contents with divider sheets with typed tab titles under reinforced plastic tabs. Place dividers at beginning of each chapter, part, section, and appendix.
 - 4. Provide a table of contents for each volume.
 - 5. Provide directory listing as appropriate with names addresses, and telephone numbers of Design Professional, Contractor, subcontractors, equipment suppliers, and nearest service representatives. Provide emergency 24-hour service contact information for all subcontractors, service contractors and principal vendors.
 - 6. Provide electronic USB thumb drive with each manual including all data required to be submitted electronically. Include hard copy with each manual.

1.3 WARRANTIES

- A. Provide duplicate notarized copies of special and extended warranties as required by individual specifications sections.
- B. Submit warranties to Design Professional prior to or in conjunction with submission of Notice of Substantial Completion.

- C. Execute and assemble warranties from subcontractors, suppliers, and manufacturers.
- D. Provide Table of Contents and assemble in three ring binder with a hard durable plastic cover. Internally subdivide the binder contents with permanent page dividers, with tab titling clearly typed under reinforced laminated plastic tabs.
- E. For items of work delayed beyond date of Substantial Completion, provide updated warranty submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.4 CERTIFICATES OF INSPECTION AND COMPLIANCE

- A. For inspections throughout the construction period required by regulatory agencies, obtain and maintain certificates issued to show compliance.
- B. Assemble certificates and any formal written evidence of regulatory compliance in three ring binder with table of contents and submit to Design Professional prior to or in conjunction with submission of Notice of Substantial Completion.
- C. Certificate of Occupancy: Prior to Substantial Completion, obtain from authorities having jurisdiction Certificate of Occupancy. Submit with Notice for Substantial Completion.

1.5 INSURANCE INFORMATION

- A. Submit prior to or in conjunction with submission of Contractor's request for Substantial Completion information regarding insurance including change over requirements and insurance extensions.

1.6 MAINTENANCE TOOLS

- A. Provide any hardware and software tools (including software keys) that are proprietary to the mechanical systems and that may be necessary for service during their lifecycle.
- B. Tools shall be as provided or recommended by manufacturers of installed equipment and systems. Types and sizes shall be as specifically required for installed products.
- C. Tools shall be available and their use demonstrated during training sessions specified in Section 01 7500 - Starting, Adjusting, and Demonstrating.
- D. Prior to, or concurrent with Contractor's request for Substantial Completion, deliver maintenance tools to Owner's representative. Prepare inventory of tools provided and obtain receipt from Owner's representative.

1.7EXTRA MATERIALS

- A. Provide spare parts and maintenance materials in quantities specified in individual sections.
- B. Extra materials shall be produced by the same manufacturer of and compatible with the installed products.
- C. Prior to or concurrent with submission of Notice of Substantial Completion deliver extra materials in unopened containers to Owner's representative at designated storage area at project site and place in location as directed. Obtain receipt from Owner's representative.
- D. During one year correction period:
 - 1. Extra materials may be used by Contractor to replace expendable and normally worn parts.
 - 2. Extra materials used by Contractor for replacement of defective products shall be replaced at no additional cost to Owner.

1.8KEYS

- A. Prior to or in conjunction with submission of Contractor's request for Substantial Completion, provide Owner with all keys for:
 - 1. Door hardware locks after re-keying in accordance with Section 08 7100 - Door Hardware.
 - 2. Access doors and panels.
 - 3. Electrical panel boards and other equipment.
- B. Provide a minimum of two keys for each lock.
- C. Clearly label each key as to function and location of lock.
- D. Obtain receipt from Owner's representative.
- E. Prior to, or in conjunction with Final Completion, return all keys lent out by Owner to Contractor for access to existing spaces, gates, etc. for the Work. Obtain receipt from Owner.

1.9 MISCELLANEOUS SECURITY-RELATED MATERIALS AND COMPONENTS

A. Prior to or in conjunction with Final Completion and in accordance with Article 9.10.1 – General Conditions of the Contract, deliver to Owner and obtain receipt for:

1. All miscellaneous security-related items loaned to Contractor during the progress of the job, including:
 - a.. Owner-furnished security badges and passes
 - b. Owner-furnished construction signs

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01 7800

SECTION 01 7810 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. See all Divisions listed herein and contained contract requirements for specific requirements for Project Record Documents of products in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Submit two sets of marked-up Record Prints.
- B. Record Specifications: Submit two copies of Project's Specifications, including addenda and contract modifications.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 - 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include complete set, identify Drawings included.
 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01 7810

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Section includes: Training of Owner's designated personnel in operation and maintenance of equipment and systems.
- B. Related sections:
 - 1. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.

1.2 SUBMITTALS

- A. Provide in accordance with Section 01 3300 - Submittal Procedures:
 - 1. List of names, resumes, and qualifications of personnel conducting training sessions.
 - 2. Preliminary schedule listing times, dates, and outline showing organization and proposed contents of training sessions for approval by Design Professional and Owner.
 - 3. Copies of training manuals and other materials to be used in training sessions for approval by Design Professional and Owner.
 - 4. Provide Owner additional copy of audio visual material on the same media used in training sessions.
 - 5. Three (3) copies of training manuals for future use in training by Owner.
 - 6. Submit report within 1 week after completion of training that sessions have been satisfactorily completed. Give times, dates, list of persons trained, and summary of instructions.

1.3 QUALITY ASSURANCE

- A. Personnel conducting demonstration and training sessions shall be knowledgeable of installation, operation, sequence of operations, and maintenance of specific project equipment and systems. Where appropriate manufacturer's representatives shall conduct training.

PART 2- PRODUCTS**2.1 TRAINING MATERIALS**

- A. Training manuals: Loose leaf notebook format with agenda and objectives of each lesson.
 - 1. Manuals shall describe function, operation, sequence of operations, and maintenance of various

items of equipment and be suitable for personnel with high school education.

2. Manuals shall be suitable for future training of Owner personnel by Owner staff.
 3. Manuals shall be a useful reference for staff maintaining facility.
- B. Visual aids: Provide charts, handouts, overhead projector slides, electronic presentations, and other visual aids required to make effective presentation and facilitate training.
1. Equipment needed for showing visual training aids shall be provided by Contractor.
 2. Visual aids shall be suitable for use by Owner's staff to train additional personnel in the future.

PART 3 - EXECUTION

2.1 SCHEDULING

- A. Schedule demonstration and training sessions after equipment and systems have been completely installed, startup completed, and adjustments made. Single demonstration and training session shall be conducted of all items prior to substantial completion. Schedule with Design Professional to accommodate Owner's representatives.

2.2 DEMONSTRATION AND TRAINING

- A. Provide demonstration and training session to emphasize operation, sequence of operations, use, and maintenance of installed items and systems:
1. Mechanical systems specified in Divisions 21, 22 and 23.
 2. Integrated Automated Controls specified in Division 25.
 3. Electrical systems specified in Division 26, 27 and 28.
 4. Other items and systems as designated by Design Professional or requested by Owner.
- B. Conduct at project site using actual installed equipment and systems.
- C. Owner shall be responsible for designating and notifying personnel to attend and ensuring attendance at scheduled sessions.
- D. Have copies of operation and maintenance manuals specified in Section 01 7800 - Closeout Submittals available. Use as training aids. Include training on each of written sequence of operations contained in the Operations & Maintenance Manual.
- E. Owner shall have right to record or video tape demonstration and training sessions.

END OF SECTION 01 7900

SECTION 02 4119 - SELECTIVE 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 selected buildings or structures and/or portions of buildings or structures.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 00 3119 "Existing Condition Information" for information related to hazardous material investigations.
2. Section 01 2310 "Bid Lots" for descriptions of buildings or structures to be demolished and portions of structures requiring dismantling and salvage operations which may become part of the Work only if certain bid lots are accepted by the Owner and enumerated in the Agreement.
3. Section 01 1000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
4. Section 01 3233 "Photographic Documentation" to record existing conditions.
5. Section 01 5639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
6. Section 01 7300 "Execution" for cutting and patching procedures.
7. Section 31 1000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

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. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's site operation manager and on-site operations are uninterrupted.

2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Coordination of Owner's continuing occupancy of portions of existing buildings and of Owner's partial occupancy of completed Work.
- D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 01 3233 "Photographic Documentation." Submit before Work begins.
- E. 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 an EPA-approved certification program.
- 1.9 FIELD CONDITIONS
- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Refer to Section 00 3119 "Existing Condition Information" for information related to hazardous material investigations for potential hazardous materials which may be present in buildings and structures to be selectively demolished. Examine report(s) to become aware of locations where hazardous materials are present.
1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. Storage or sale of removed items or materials on-site is not permitted.

- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective 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. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video, and templates.
 - 1. Comply with requirements specified in Section 01 3233 "Photographic Documentation."
 - 2. 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.

3.3 UTILITY SERVICES AND MECHANICAL/PLUMBING/IRRIGATION/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect equipment that has not been removed.

5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 5000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 4. Maintain fire watch during and for at least one (1) hour after flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Legally dispose of demolished items and materials.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
 1. Clean salvaged items.
 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 Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or 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.
 3. Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.9 SELECTIVE DEMOLITION SCHEDULE

- A. Refer to Drawings and Section 01 2310 "Bid Lots" for descriptions of buildings or structures to be demolished and portions of structures requiring dismantling and salvage operations which may become part of the Work only if certain bid lots are accepted by the Owner and enumerated in the Agreement.

END OF SECTION 02 4119

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and General Supplemental Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

- Footings.
- Foundation walls.
- Slabs-on-grade.

- B. Related Sections may include the following:

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

Indicate amounts of mixing water to be withheld for later addition at Project site.

- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.

- E. Samples: For water stops.
- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

- G. Material Certificates: For each of the following, signed by manufacturers:

Cementitious materials.
Admixtures.
Form materials and form-release agents.
Steel reinforcement and accessories.
Fiber reinforcement.
Water stops.
Curing compounds.
Floor and slab treatments.
Bonding agents.
Adhesives.
Vapor retarders.
Semi-rigid joint filler.
Joint-filler strips.
Repair materials.

- H. Field quality-control test and inspection reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

- C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
 - ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Water stops: Store water stops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - Plywood, metal, or other approved panel materials.
- B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

Formulate form-release agent with rust inhibitor for steel form-facing materials.

- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

Portland Cement: ASTM C 150, Type II

- a. Fly Ash: ASTM C 618, Class F.
- b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

- B. Normal-Weight Aggregates: ASTM C 33, Class 3S, 3M coarse aggregate or better, graded. Provide aggregates from a single source.

Maximum Coarse-Aggregate Size: 1-1/2 inch nominal.

Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- C. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

Retarding Admixture: ASTM C 494/C 494M, Type B.

Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.7 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

Available Manufacturers:

- a. Greenstreak.
- b. Progress Unlimited, Inc.
- c. Williams Products, Inc.

- B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

Available Products:

- a. Colloid Environmental Technologies Company; Volclay Waterstop-RX.
- b. Concrete Sealants Inc.; Conseal CS-231.
- c. Greenstreak; Swellstop.
- d. Henry Company, Sealants Division; Hydro-Flex.
- e. JP Specialties, Inc.; Earthshield Type 20.
- f. Progress Unlimited, Inc.; Superstop.
- g. TCMiraDRI; Mirastop.

2.8 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

Available Products:

- a. Fortifiber Corporation; Moistop Ultra A.
- b. Raven Industries Inc.; Vapor Block 15
- c. Reef Industries, Inc.; Griffolyn Type-65G

2.9 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing 3/8-inch sieve.

Available Products:

- a. Anti-Hydro International, Inc.; Emery.
 - b. Dayton Superior Corporation; Emery Non-Slip.
 - c. Emeri-Crete, Inc.; Emeri-Topcrete.
 - d. Lambert Corporation; EMAG-20.
 - e. L&M Construction Chemicals, Inc.; Grip It.
 - f. Metalcrete Industries; Metco Anti-Skid Aggregate.
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

Available Products:

- a. Burke by Edoco; Titan Hard.
- b. ChemMasters; Chemisil Plus.
- c. ChemTec International; ChemTec One.
- d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
- e. Curecrete Distribution Inc.; Ashford Formula.
- f. Dayton Superior Corporation; Day-Chem Sure Hard.
- g. Euclid Chemical Company (The); Euco Diamond Hard.
- h. Kaufman Products, Inc.; SureHard.
- i. L&M Construction Chemicals, Inc.; Seal Hard.
- j. Meadows, W. R., Inc.; Liqui-Hard.
- k. Metalcrete Industries; Floorsaver.
- l. Nox-Crete Products Group, Kinsman Corporation; Duranox.
- m. Symons Corporation, a Dayton Superior Company; Buff Hard.
- n. US Mix Products Company; US Spec Industraseal.
- o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS.

2.10 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

Available Products:

- a. Axim Concrete Technologies; Cimfilm.
- b. Burke by Edoco; BurkeFilm.
- c. ChemMasters; Spray-Film.
- d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
- e. Dayton Superior Corporation; Sure Film.
- f. Euclid Chemical Company (The); Eucobar.

- g. Kaufman Products, Inc.; Vapor Aid.
 - h. Lambert Corporation; Lambco Skin.
 - i. L&M Construction Chemicals, Inc.; E-Con.
 - j. MBT Protection and Repair, Div. of ChemRex; Confilm.
 - k. Meadows, W. R., Inc.; Sealtight Evapre.
 - l. Metalcrete Industries; Waterhold.
 - m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
 - n. Sika Corporation, Inc.; SikaFilm.
 - o. Symons Corporation, a Dayton Superior Company; Finishing Aid.
 - p. Unitex; Pro-Film.
 - q. US Mix Products Company; US Spec Monofilm ER.
 - r. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

Available Products:

- a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
 - b. Burke by Edoco; Aqua Resin Cure.
 - c. ChemMasters; Safe-Cure Clear.
 - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; W.B. Resin Cure.
 - e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
 - f. Euclid Chemical Company (The); Kurez DR VOX.
 - g. Kaufman Products, Inc.; Thinilm 420.
 - h. Lambert Corporation; Aqua Kure-Clear.
 - i. L&M Construction Chemicals, Inc.; L&M Cure R.
 - j. Meadows, W. R., Inc.; 1100 Clear.
 - k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
 - l. Symons Corporation, a Dayton Superior Company; Resi-Chem Clear Cure.
 - m. Tamms Industries, Inc.; Horncure WB 30.
 - n. Unitex; Hydro Cure 309.
 - o. US Mix Products Company; US Spec Maxcure Resin Clear.
 - p. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

Available Products:

- a. Anti-Hydro International, Inc.; AH Clear Cure WB.
- b. Burke by Edoco; Spartan Cote WB II.
- c. ChemMasters; Safe-Cure & Seal 20.

- d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Cure and Seal WB.
- e. Dayton Superior Corporation; Safe Cure and Seal (J-18).
- f. Euclid Chemical Company (The); Aqua Cure VOX.
- g. Kaufman Products, Inc.; Cure & Seal 309 Emulsion.
- h. Lambert Corporation; Glazecote Sealer-20.
- i. L&M Construction Chemicals, Inc.; Dress & Seal WB.
- j. Meadows, W. R., Inc.; Vocomp-20.
- k. Metalcrete Industries; Metcure.
- l. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 150E.
- m. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
- n. Tamms Industries, Inc.; Clearseal WB 150.
- o. Unitex; Hydro Seal.
- p. US Mix Products Company; US Spec Hydrasheen 15 percent
- q. Vexcon Chemicals, Inc.; Starseal 309.

2.11 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

Types I and II, non-load bearing; IV and V, load bearing; for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Reglets: Fabricate reglets of not less than 0.0217-inch- thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- E. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

Fly Ash: 25 percent.

Combined Fly Ash and Pozzolan: 25 percent.

Ground Granulated Blast-Furnace Slag: 50 percent.

Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

Silica Fume: 10 percent.

Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

- D. Admixtures: Use admixtures according to manufacturer's written instructions.

Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.

Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:

Minimum Compressive Strength: 4000psi at 28 days.

Maximum Water-Cementitious Materials Ratio: 0.45

Slump Limit: 4 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

- B. Foundation Walls: Proportion normal-weight concrete mixture as follows:

Minimum Compressive Strength: 4000 psi at 28 days.

Maximum Water-Cementitious Materials Ratio: 0.45.

Slump Limit: 3 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

- C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

Minimum Compressive Strength: 4000 psi (3000 psi for interior) at 28 days.

Minimum Cementitious Materials Ratio: 0.45.

Slump Limit: 3 inches plus or minus 1 inch.

Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-1/2 inch nominal maximum aggregate size.

Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate.

2.14 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.

When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

Install keyways, reglets, recesses, and the like, for easy removal.

Do not use rust-stained steel form-facing material.

- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.

- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

Do not remove shoring or reshoring until measurement of slab tolerances is complete.

- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

Lap joints 6 inches and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

- C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section 07 92 00 "Joint Sealants," are indicated.

Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

- D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Maintain reinforcement in position on chairs during concrete placement.

Screed slab surfaces with a straightedge and strike off to correct elevations.

Slope surfaces uniformly to drains where required.

Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

- F. Hot-Weather Placement: Comply with ACI 301 and as follows:

Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water 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.

Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

Apply to concrete surfaces not exposed to public view

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

Apply to concrete surfaces exposed to public view.

- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.

Apply scratch finish to surfaces indicated to receive concrete floor toppings.

- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.

Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing.

- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

Apply a trowel finish to surfaces indicated.

- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

Comply with flatness and levelness tolerances for trowel finished floor surfaces.

- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.

After broadcasting and tamping, apply float finish.

After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend

with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

- a. Water.
- b. Continuous water-fog spray.
- c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- d. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
- e. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

- f. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..

Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- g. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.

Do not apply to concrete that is less than 28 days' old.

Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.15 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.16 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

After concrete has cured at least 14 days, correct high areas by grinding.

Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a uniform inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

- B. Inspections:

Steel reinforcement placement.

Steel reinforcement welding.

Headed bolts and studs.

Verification of use of required design mixture.

Concrete placement, including conveying and depositing.

Curing procedures and maintenance of curing temperature.

Verification of concrete strength before removal of shores and forms from beams and slabs.

- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

- a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

Compression Test Specimens: ASTM C 31/C 31M.

- b. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

- c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

Test results shall be reported in writing to Architect, concrete supplier, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION

SECTION 03 0516 – UNDERSLAB VAPOR BARRIER**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. Sheet vapor barrier and installation accessories for installation under concrete slabs on grade.

B. Related Requirements:

- 1. Section 03 3000 "Cast-in-Place Concrete" for preparation of subgrade, granular fill, placement of concrete.

1.3 REFERENCE STANDARDS

- A. Technical Reference - American Concrete Institute (ACI):
- B. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
- C. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.
- D. 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 2018a.
- E. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs 2017.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 - 1. Require representatives of each entity directly concerned with underslab vapor barrier for cast-in-place concrete to attend.

2. Review special inspection and testing and inspecting agency procedures for field quality control, vapor barrier installation, and concrete placement.

1.5 ACTION SUBMITTALS

- A. Product Data: Submit manufacturers' data on manufactured products.
- B. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.
 1. Include installation instructions for placement, seaming, pipe boot installation, penetration prevention and repair, and perimeter seal per ASTM E1643.
- C. Samples for Verification: For each type of product, prepared as Samples of size indicated below:
 1. Vapor Barrier: 12 by 12-inch minimum sample.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer and manufacturer.
- B. Summary of Test Results per paragraph 9.3 of ASTM E1745.
 1. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer who has specialized in installation of work similar to that required for this project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain underslab vapor barrier system from single source from single manufacturer, or as recommended in writing by manufacturer of underslab vapor barrier system.

2.2 UNDERSLAB VAPOR BARRIERS

- A. Plastic Sheet Vapor Barrier: Manufactured from prime virgin resins, meeting or exceeding ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape for a complete installation.
1. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Stego Industries, LLC; Stego Wrap 15-mil Vapor Barrier.**
 - b. Reef Industries, Inc.; VaporGuard.
 - c. Alumiseal; Zero-Perm.
 - d. Or Approved Equal.
 2. Substitutions: See Section 01 6000 Product Requirements.
 - a. For any product not identified as "Basis of Design", submit information as specified for substitutions.
 3. Thickness: 15 mils minimum thickness.
 4. Water-Vapor Permeance: 0.012 perms or less; ASTM E 96 or ASTM F 1249.
 5. Tensile Strength: 45.0 lbf/inch; ASTM D 882.
 6. Puncture Resistance: 2200 grams minimum; ASTM D 1709.
- B. Underslab Vapor Barrier Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.
1. Seam Tape: High-density polyethylene film and rubber-based pressure sensitive adhesive, complying with ASTM E 96, water vapor transmission rate of 0.3 perms or less.
 - a. Basis-of-Design Product: Stego Industries, LLC; Stego Tape and/or Stego Cold Weather Tape as recommended by Manufacturer for site conditions.
 2. Vapor Proofing Mastic: Medium-viscosity, water-based, polymer-modified anionic bituminous/asphalt emulsion, which exhibits bonding, elongation and waterproofing characteristics, complying with ASTM E 96, water vapor transmission rate of 0.3 perms or less.
 - a. Basis-of-Design Product: Stego Industries, LLC; Stego Mastic.
 3. Pipe Boots: Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.
 - a. Basis-of-Design Product: Stego Industries, LLC; Stego Pre-cut Pipe Boots.
 4. Perimeter/edge seal:

- a. Basis-of-Design Product: Stego Industries, LLC; Stego Crete Claw.
- b. Basis-of-Design Product: Stego Industries, LLC; Stego Term Bar.
- c. Basis-of-Design Product: Stego Industries, LLC; StegoTack Tape.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.
 1. Level and compact base material.

3.2 INSTALLATION

1. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
2. Install vapor barrier under interior slabs on grade where indicated; lap sheet over footings and seal to foundation walls.
3. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
4. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself. Seal vapor barrier utilizing one of the following methods:
 - a. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions.
 - b. Seal vapor barrier to the entire perimeter wall or footing/grade beam with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
5. Lap joints minimum 6 inches and seal with manufacturer's seam tape.
6. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
7. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
8. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
9. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
10. Repair damaged vapor retarder before covering with other materials.

- a. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

END OF SECTION 03 0516

SECTION 04 2000 - UNIT MASONRY ASSEMBLIES

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. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.
7. .

B. Related Sections:

1. Delete first subparagraph below if installation of anchor sections is included in this Section.
2. Division 05 Section 05 12 00 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
3. Division 07 Section 07 92 00 "Joint Sealants" for sealing control and expansion joints in unit masonry.
4. Division 07 Section 07 60 00 "Flashing and Sheet Metal" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

C. Products furnished, but not installed, under this Section include the following:

1. Dovetail slots for masonry anchors, installed under Division 03 Section 03 30 00 "Cast-in-Place Concrete."
2. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section 05 12 00 "Structural Steel Framing."

D. Products installed, but not furnished, under this Section include the following:

1. Three subparagraphs below are examples only. Revise to suit Project.
2. Steel lintels and shelf angles for unit masonry, furnished under Division 05 Section 05 50 00 "Metal Fabrications."
3. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section 07 60 00 "Flashing and Sheet Metal."

- E. Allowances: The following are included under the allowances indicated as specified in Division 01 Section 01 21 13 "Cash Allowances":

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Verification: For each type and color of the following:
 - 1. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 - 2. Weep holes and vents.
 - 3. Accessories embedded in masonry.
- D. Qualification Data: For testing agency.
- E. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
 - 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For masonry units include data and calculations establishing average net-area compressive strength of units.
 - 2. Cementitious materials. Include brand, type, and name of manufacturer.

3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 4. Grout mixes. Include description of type and proportions of ingredients.
 5. Reinforcing bars.
 6. Joint reinforcement.
 7. Anchors, ties, and metal accessories.
- F. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- G. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- H. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
1. Concrete Masonry Unit Test: For each type of unit required, per ASTM C 140.
 2. Mortar Test (Property Specification): For each mix required, per ASTM C 780.
 3. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019.
- E. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- F. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
 - 2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide bullnose units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 2. Density Classification: Normal weight.
 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 4. Retain first subparagraph below if color and texture of faces are critical. ASTM C 90 requires at least four units for sample, representing the range of color and texture permitted.
 5. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
 6. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.3 CONCRETE AND MASONRY LINTELS

- A. General: Provide one of the following:

- B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Division 03 Section "Cast-in-Place Concrete", and with reinforcing bars indicated.
- C. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
 - 1. Products: Subject to compliance with requirements:
 - a. Capital Materials Corporation; Flamingo Color Masonry Cement.
 - b. Essroc, Italcementi Group;
 - c. Holcim (US) Inc.; Lafarge North America Inc.
 - d. Lehigh Cement Company.
 - e. National Cement Company, Inc.; Coosa Masonry Cement.
- E. Mortar Cement: ASTM C 1329.
 - 1. Products: Subject to compliance with requirements:
 - a. Lafarge North America Inc.;
- F. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- G. Aggregate for Grout: ASTM C 404.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
 - c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.
- I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer.
 1. Products: Subject to compliance with requirements:
 - a. ACM Chemistries; RainBloc for Mortar.
 - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
 - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
- J. Water: Potable.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615, Grade 60.
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 1. Interior Walls: Hot-dip galvanized, carbon steel.
 2. Exterior Walls: Hot-dip galvanized, **carbon** steel.
 3. Wire Size for Side Rods: 0.187-inch diameter.
 4. Wire Size for Cross Rods: 0.187-inch diameter.
 5. Wire Size for Veneer Ties: 0.187-inch diameter.
 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
 1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 641/A 641M, Class 1 coating.
 2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 3. Stainless-Steel Wire: ASTM A 580/A 580M, [**Type 304**] [**Type 316**].
 4. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
 5. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 6. Stainless-Steel Sheet: ASTM A 666, [**Type 304**] [**Type 316**].

7. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 8. Stainless-Steel Bars: ASTM A 276 or ASTM a 666, Type 304.
- B. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 7.6 to 12.7 mm and an amplitude of 0.06 to 0.10 inch.
- C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- D. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
1. Wire: Fabricate from 1/4-inch diameter, hot-dip galvanized steel wire. Mill-galvanized wire ties may be used in interior walls unless otherwise indicated.
- E. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch diameter, hot-dip galvanized steel wire.
- F. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
- G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated bent to configuration indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.7 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from **styrene-butadiene-rubber** compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

- D. indicated.

2.9 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 - 1. Manufacturers: Subject to compliance with requirements:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.

2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime, masonry cement or mortar cement mortar unless otherwise indicated.
 - 3. For exterior masonry, use Portland cement-lime or mortar cement mortar.
 - 4. For reinforced masonry, use Portland cement-lime or mortar cement mortar.
 - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For masonry below grade or in contact with earth, use Type M Type S.
 - 2. For reinforced masonry, use Type S .
 - 3. For mortar parge coats, use Type S.
 - 4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, un-chipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 - 3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

3.6 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at [**corners,**] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
 - 1. Provide an open space not less than 2 inches wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally.

3.8 ANCHORING MASONRY VENEERS

3.9 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
 - 2. Install interlocking units designed for control joints.

3.10 LINTELS

- A. Provide concrete or masonry lintels where shown and where openings of more than 24 inches for block-size units are shown without structural steel or other supporting lintels.

- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.11 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage uniform inspector to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and] compressive strength.

- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- H. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.13 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.14 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

3.15 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches in each dimension.
 - 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving."
 - 3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 1200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Structural steel.
- 2. Grout.

B. Related Sections:

- 1. Division 05 Section 05 31 00 "Steel Decking"
- 2. Division 05 Section 05 50 00 "Metal Fabrications"

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents.
 - 1. Select and complete connections using schematic details indicated on drawings.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical high-strength bolted connections.

- C. Qualification Data: For qualified testing agency.
- D. Welding certificates.
- E. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
 - 1. In lieu of participation in the AISC Quality Certification Program or AISC-Certified, the fabricator/erector may employ the services of an approved independent qualified inspector for structural steel. Inspector qualifications and special inspections shall conform to the requirements of the International Building Code, Chapter 17 and shall be in accordance with AWS D1.1.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE
 - 1. In lieu of participation in the AISC Quality Certification Program or AISC-Certified, the fabricator/erector may employ the services of an approved independent qualified inspector for structural steel. Inspector qualifications and special inspections shall conform to the requirements of the International Building Code, Chapter 17 and shall be in accordance with AWS D1.1.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 P2 P3 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M, Grade 50.
- B. Channels, Angles, M, S-Shapes: ASTM A 572/A 572M, Grade 50.
- C. Plate and Bar: ASTM A 36/A.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B structural tubing.
- E. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts.
- B. Headed Anchor Rods: ASTM F 1554, Grade 36.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Hot-dip zinc coating, ASTM A 153.
- C. Threaded Rods: ASTM A 36.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Washers: ASTM F 436, Type 1, hardened; ASTM A 36 carbon steel.
 - 3. Finish: Hot-dip zinc coating, ASTM A 15.

2.3 PRIMER

- A. Primer: Comply with Division 09 Section. 09 91 00 "Painting".
- B. Galvanizing Repair Paint: SSPC-Paint 2ASTM A 780.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning"
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- H. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.
- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
 3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
 6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
 8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
 9. SSPC-SP 8, "Pickling."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film

thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 2. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Plates: Clean concrete and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will

be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tab where indicated, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections if deemed necessary by the Structural Engineer of Record.
- B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 Section 09 91 00 "Painting".

END OF SECTION

SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. K-series steel joists.
- 2. Joist accessories.

- B. Related Sections include the following:

- 1. Division 03 Section 03 3 000 "Cast-in-Place Concrete" for installing bearing plates in concrete.
- 2. Division 04 Section 04 22 00 "Unit Masonry Assemblies" for installing bearing plates in unit masonry.

1.3 DEFINITIONS

- A. SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.
- B. Design special joists to withstand design loads with live load deflections no greater than the following:
 - 1. Floor Joists: Vertical deflection of 1/360 of the span.
 - 2. Roof Joists: Vertical deflection of 1/240 of the span.

1.5 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Show layout, designation, number, type, location, and spacing of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
 - 1. Indicate locations and details of bearing plates to be embedded in other construction.
- C. Welding certificates.
- D. Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.
- E. Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications."
 - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

- A. Deliver steel bearing plates in time to be built into cast-in-place concrete and masonry construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.
- B. Steel Bearing Plates: ASTM A 36/A 36M.
- C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
 - 1. Finish: Plain
- D. High-Strength Bolts, Nuts, and Washers: ASTM A 325 Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Plain
- E. Welding Electrodes: Comply with AWS standards.

2.2 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.3 K-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: K-series steel joists.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
- C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- D. Provide holes in chord members for connecting and securing other construction to joists.
- E. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- F. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- G. Camber joists according to SJI's "Specifications."

- H. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging as indicated of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." As Furnish additional erection bridging if required for stability.
- C. Bridging: Fabricate as indicated and according to SJI's "Specifications." Furnish additional erection bridging if required for stability.
- D. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
- E. Steel bearing plates with integral anchorages are specified in Division Section 05 50 00 "Metal Fabrications."
- F. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.
- G. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.5 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.
- C. Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.
- D. Shop priming of joists and joist accessories is specified in Division 09 Section 09 91 00 "Painting".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
 1. Before installation, splice joists delivered to Project site in more than one piece.
 2. Space, adjust, and align joists accurately in location before permanently fastening.
 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.
- C. Field weld joists to supporting steel bearing plate and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts.
- E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports..
- B. Field welds will be visually inspected according to AWS D1.1/D1.1M.
- C. In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable:
 1. Radiographic Testing: ASTM E 94.
 2. Magnetic Particle Inspection: ASTM E 709.
 3. Ultrasonic Testing: ASTM E 164.
 4. Liquid Penetrant Inspection: ASTM E 165.
- D. Bolted connections will be visually inspected.

- E. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- F. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- G. Additional testing paid for by the contractor will be performed to determine compliance of corrected Work with specified requirements if deemed necessary by the Structural Engineer of Record.

3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.
 - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 Section 09 91 00 "Painting".
- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 3100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Roof deck.

- B. Related Sections may include the following:

- 1. Division 03 Section 03 30 00 "Cast-in-Place Concrete" for concrete fill.
- 2. Division 05 Section 05 12 00 "Structural Steel Framing" for shop- and field-welded shear connectors.
- 3. Division 05 Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
- 4. Division 09 Sections 09 91 00 "Painting" for repair painting of primed deck.

1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.

- B. LEED Submittal:

- 1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - a. Include statement indicating costs for each product having recycled content.

- C. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

- D. Product Certificates: For each type of steel deck, signed by product manufacturer.

- E. Welding certificates.

- F. Field quality-control test and inspection reports.

- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
 - 2. Acoustical roof deck.
- H. Research/Evaluation Reports: For steel deck.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- E. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
 - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

1.6 COORDINATION

- A. Coordinate installation of sound-absorbing insulation strips in topside ribs of acoustical deck with roofing installation specified in Division 07 Section 07 21 00 "Building Insulation" to ensure protection of insulation strips against damage from effects of weather and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Steel Deck:
 - a. ASC Profiles, Inc.
 - b. Canam Steel Corp.;The Canam Manac Group.
 - c. Consolidated Systems, Inc.
 - d. DACS, Inc.
 - e. D-Mac Industries Inc.
 - f. Epic Metals Corporation.
 - g. Marlyn Steel Decks, Inc.
 - h. New Millennium Building Systems, LLC.
 - i. Nucor Corp.; Vulcraft Division.
 - j. Roof Deck, Inc.
 - k. United Steel Deck, Inc.
 - l. Valley Joist; Division of EBSCO Industries, Inc.
 - m. Vercor Manufacturing Co.
 - n. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
 - o. <Insert manufacturer's name.>

2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
1. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 zinc coating.
 2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, , Grade, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard
 3. Deck Profile: As indicated.
 4. Profile Depth: As indicated.
 5. Span Condition: As indicated.
 6. Side Laps: Overlapped.

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- C. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members TEK Screws of size and spacing as indicated on drawings.
- B. Side-Lap and Perimeter Edge Fastening: Mechanically fasten with TEK Screws of size and spacing as indicated on drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space Mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in in Division 07 Section 07 21 00 "Building Insulation".

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
 - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 09 Section 09 91 00 "Painting".
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 4000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior load-bearing wall framing.
 - 2. Interior load-bearing wall framing.
 - 3. Exterior non-load-bearing wall framing.
- B. Related Sections include the following:
 - 1. Division 05 Section 05 50 00 "Metal Fabrications" for masonry shelf angles and connections.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height.
 - b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft..
 - c. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.
 - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.4 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- D. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
1. Allied Studco.
 2. AllSteel Products, Inc.
 3. California Expanded Metal Products Company.
 4. Clark Steel Framing.
 5. Consolidated Fabricators Corp.; Building Products Division.
 6. Craco Metals Manufacturing, LLC.
 7. Custom Stud, Inc.
 8. Dale/Incor.
 9. Design Shapes in Steel.
 10. Dietrich Metal Framing; a Worthington Industries Company.
 11. Formetal Co. Inc. (The).
 12. Innovative Steel Systems.
 13. MarinoWare; a division of Ware Industries.
 14. Quail Run Building Materials, Inc.
 15. SCAFCO Corporation.
 16. Southeastern Stud & Components, Inc.
 17. Steel Construction Systems.
 18. Steeler, Inc.
 19. Super Stud Building Products, Inc.
 20. United Metal Products, Inc.

2.2 MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
1. Grade: ST33H or ST50H as required by structural performance.
 2. Coating: G90 or equivalent.

2.3 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges.

- B. See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers and products.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dietrich Metal Framing; a Worthington Industries Company.
 - b. MarinoWare, a division of Ware Industries.
 - c. SCAFCO Corporation
 - d. The Steel Network, Inc.

2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.
 - 8. Stud kickers, knee braces, and girts.
 - 9. Joist hangers and end closures.
 - 10. Hole reinforcing plates.
 - 11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36 threaded carbon-steel and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.8 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
 - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Install insulation, specified in Division 07 Section 07 21 00 "Building Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - 1. Anchor Spacing: As indicated
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 - 1. Stud Spacing: As indicated.

- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
 - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced as indicated on Shop Drawings. Fasten at each stud intersection.
 - 1. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports if deemed necessary by the Structural Engineer of Record.
- B. Field and shop welds will be subject to testing and inspecting.

- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 5000 - METAL FABRICATIONS**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. Steel framing and supports for countertops.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Metal floor plate (checkered plate) and supports used for sidewalk culvert(s) and utility vault lids.
5. Metal bollards.
6. Metal fabrications as shown on Drawings, not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

1. Section 03 3000 "Cast-in-Place Concrete" for metal fabrications and other items cast into concrete.
2. Section 04 2000 "Unit Masonry" for placement of metal fabrications in unit masonry.
3. Section 05 5213 "Pipe and Tube Railings" for pipe and tube railings.
4. Section 05 7000 "Decorative Metal" for structural steel plate service counter and decorative metal dumpster and equipment yard gates.
5. Sections 09 9113 "Exterior Painting" and 09 9123 "Interior Painting" for finishing items specified in this Section.

1.3 REFERENCES

- A. General: The documents listed below are hereby declared to be a part of this Section of Specifications, the same as if fully set forth herein. Except as otherwise noted, any documents

which are referenced in any of the listed documents are also a part of this Section of Specifications, the same as if fully set forth herein. The Contractor is responsible for obtaining copies of the referenced documents and for making himself familiar with the relevant portions of them. Except as specifically stated otherwise, the edition or revision of each document which is in effect on the date of issuance of the notice to proceed with construction of this project shall be used.

B. American Society for Testing and Materials (ASTM)RM

1. ASTM A6 - General Requirements of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use
2. ASTM A 36 - Structural Steel
3. ASTM A48 - Gray Iron Castings
4. ASTM A 53 - Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
5. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality
6. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
7. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware
8. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
9. ASTM A283 - Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
10. ASTM A307 - Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
11. ASTM A325 - High-Strength Bolts for Structural Steel Joints
12. ASTM A366 - Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
13. ASTM A 500 - Cold-Formed Welded and Seamless Steel Structural Tubing in Rounds and Shapes
14. ASTM A525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
15. ASTM A563 - Carbon and Alloy Steel Nuts
16. ASTM A569 - Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled, Sheet and Strip, Commercial Quality
17. ASTM A570 - Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
18. ASTM A572 - High-Strength Low-Alloy Columbium-Vanadium Steel of Structural Quality
19. ASTM A611 - Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
20. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
21. ASTM A668 - Steel Forgings, Carbon and Alloy, for General Industrial Use
22. ASTM A 786 - Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
23. ASTM A924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
24. ASTM A992 - Steel for Structural Shapes for Use in Building Framing
25. ASTM C1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
26. ASTM F436 - Hardened Steel Washers

C. American Welding Society (AWS)

1. AWS D1.1 - Structural Welding Code - Steel
2. AWS D1.3 - Structural Welding Code - Sheet Steel

D. American Institute of Steel Construction (AISC)

1. Specification for Structural Steel Buildings - ASD or LRFD.
2. Federal Specifications (FS)
3. FS QQ-F-461
4. FS RR-C-271
5. FS TT-P-31
6. FS TT-P-641
7. FS TT-P-645

E. Steel Structures Painting Council (SSPC)

1. SSPC-SP2 - Hand Tool Cleaning
2. SSPC-SP6 - Commercial Blast Cleaning

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: Manufacturer's information including specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of metal fabrications. Indicate by transmittal that copy of instructions has been distributed to the installer. Include the following:
1. Nonslip aggregates and nonslip-aggregate surface finishes.
 2. Primer, paint and/or coating products.
 3. Grout.
- B. Shop Drawings: Show fabrication and installation details of all metal fabricated assemblies which are not completely shown by manufacturer data sheets. Include plans, elevations, sections, profile, sizes, reinforcing and details of metal fabrications and their connections as required for a complete installation. Show anchorage and accessory items. Show welded connections using standard AWS welding symbols. Provide Shop Drawings are required, but not limited to the following:

1. Steel framing and supports for countertops.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Ledge, Shelf and Perimeter Angles and shapes.
5. Metal floor plate (checkered plate) and supports used for sidewalk culvert(s) and utility vault lids.
6. Metal bollards.
7. Loose steel lintels.
8. All assemblies of metal fabrications which are not completely shown by the manufacturer's data sheets.

1.6 INFORMATIONAL SUBMITTALS

- A. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- B. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.
- E. Sample Warranty: For manufacturer's special warranty for abrasive metal nosings.

1.7 QUALITY ASSURANCE

- A. General: Comply with the requirements of the referenced documents except as otherwise specified in this section. In the case of conflict between the provision(s) of these specifications and any provision(s) of any of the referenced documents, the provision(s) of these specifications shall govern. In the case of conflicts among the provisions of any of the referenced documents, the more restrictive provision shall govern, except as otherwise approved by the Architect/Engineer.
 1. AISC "LRFD Specification for Structural Steel for Building."
 2. AISI "Specification for the Design of Cold-Formed Steel Structural Members."
 3. AWS D1.1, "Structural Welding Code - Steel" and D1.3 "Structural Welding Code - Sheet Steel."
 4. ASTM A6, "General Requirements for Delivery of Rolled Steel Plates, Sheet Piling and Bars for Structural Use."
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

- C. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by in-service performance.
 - 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.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by accurate field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the Work. Allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver to site as required to avoid interruption of work.
- B. Store on blocking under shelters with supports as necessary to avoid damage due to self-weight or superimposed loads.

1.10 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
- B. Special Warranty for Abrasive Metal Nosings: Manufacturer's warranty in which manufacturer agrees to repair or replace abrasive metal nosing components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Design, engineer, fabricate, and install metal fabrications to withstand the structural loads to which they may be imposed without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel
 - 1. Steel Wide Flange (W) Shapes: ASTM A 992.
 - 2. Steel Angles, Channels, Steel Plates, Shapes and Bars: ASTM A 36/A 36M unless otherwise shown. ASTM A 572, grade 50 where shown.
 - 3. Steel Sheet: Use plain material unless galvanized material is specified.
 - a. Plain: ASTM A 570, Grade 33, 36 or 40, or ASTM A 611, Grade C or D.
 - b. Galvanized: ASTM A 653, coating designation G90.
 - 4. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
 - 5. Steel Plates to be Bent or Cold-Formed: ASTM A 283, Grade C.
 - 6. Steel Bars and Bar-Size Shapes: ASTM A 283, Grade D or ASTM A 36.
 - 7. Cold-Finished Steel Bars: ASTM A 108.
 - 8. Steel Tubing: ASTM A 500/A 500M, grade B, cold-formed steel tubing.
 - 9. Steel Pipe: ASTM A 53/A 53M, type E or S, grade B; Standard Weight (Schedule 40) unless otherwise indicated.
 - 10. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - a. Size of Channels: 1-5/8 by 1-5/8 inches, unless otherwise indicated.
 - b. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B, with G90 coating; 0.064-inch nominal thickness.

- C. Cast Iron: Either gray iron, ASTM A 48/A 48M, class 35B or better or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A 563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: L-shaped with minimum 3-inch hook, 8-inch embedment in concrete, 4-inches threaded projection, double nipped, ASTM A 307 or A36, plain or zinc coated as indicated.
- H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors, as indicated in the Drawings.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 09 9113 "Exterior Painting," Section 09 9123 Interior Painting," and Section 09 9600 "High-Performance Coatings."
- B. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. **Basis-of-Design Product:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Sherwin-Williams Company (The); Steel Spec Universal Primer, B50RV6227/B50AV8431.**
 - b. Or Approved Equal.
- C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- F. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, and nongaseous grout mixed with water to consistency suitable for application and a 30-minute working time. Minimum 5000 psi at 7 days when installed by the damp-pack method.
 - 1. **Basis-of-Design Product:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Five Star Products, Inc.; Five Star® Grout:** Fairfield, CT 06824, (800) 243-2206, <http://www.fivestarprouducts.com/>
 - b. Or Approved Equal.
- G. Concrete: Comply with requirements in Section 03 3000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

2.5 FABRICATION, GENERAL

- A. Use materials of size and thickness shown, or, if not shown, of required size and thickness to produce adequate strength and durability in the finished product for the intended use. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for the various components of work.

- B. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- F. Weld corners and seams continuously in accordance with the recommendations of AWS and comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- I. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- J. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to provide adequate support for intended use of the work.
- K. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 STEEL FABRICATION

- A. General:
 - 1. Conform to following standards of the American Institute of Steel Construction (AISC):

- a. "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings."
- b. "Code of Standard Practice for Steel Buildings and Bridges," with following exceptions:
 - 1) Connections shall be as shown on the Drawings except as specifically and individually approved otherwise by the Architect/Engineer.
2. Welding shall conform to the AWS D1.1 "Structural Welding Code-Steel" and AWS D1.3 "Structural Welding Code - Sheet Steel" and shall be performed by welders currently certified in accordance with AWS certification procedures to perform the type of welding required.
3. Mill bearing surfaces to true plane.
4. Shop connections: Welded, unless otherwise shown.
5. Field connections: Provide bolts for all field connections except where shown otherwise on Drawings.
 - a. Use direct tension indicating high-strength bolts conforming to ASTM A 325 unless shown or specified otherwise.
 - b. Use and installation of high-strength bolts: Conform to "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts", as approved by Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation, and published by AISC.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with universal shop primer specified in this Section or Section 09 9113 "Exterior Painting" and Section 09 9123 Interior Painting," unless otherwise indicated.

2.8 LEDGE, SHELF AND PERIMETER ANGLES AND SHAPES

- A. Ledge, Shelf and Perimeter Angles and Shapes: Provide steel angles, shapes and plates as indicated for the support of metal decking, joists, masonry and other items.
- B. Prime ledge, shelf and perimeter angles and shapes with universal shop primer specified in this Section or Section 09 9113 "Exterior Painting" and Section 09 9123 Interior Painting," unless otherwise indicated.

2.9 METAL FLOOR PLATE (CHECKERED PLATE)

- A. Fabricate from rolled-steel floor plate of thickness indicated below:
 - 1. Thickness: 3/8 inch, if not otherwise indicated.
- B. Provide steel angle supports as indicated.
- C. Include steel angle or steel bar stiffeners, and fixed and removable sections as indicated.
- D. Prime metal floor plate, including steel angle or steel bar stiffeners, with universal shop primer specified in this Section or Section 09 9113 "Exterior Painting" and Section 09 9123 Interior Painting," unless otherwise indicated.

2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Prime miscellaneous steel trim with universal shop primer specified in this Section or with primers specified in Section 09 9113 "Exterior Painting" and Section 09 9123 Interior Painting," unless otherwise indicated.

2.11 METAL BOLLARDS

- A. Fabricate metal bollards from steel tube shapes, as indicated.
- B. Prime bollards with universal shop primer specified in this Section or with primers specified in Section 09 9113 "Exterior Painting" or Section 09 9123 Interior Painting."

2.12 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.13 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize, after fabrication, all steel members and assemblages which are shown or specified to be galvanized, to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime, after fabrication, all iron and steel members and assemblages not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Omit shop prime coat from contact surfaces of connections, from surfaces to be field welded, and from parts to be embedded in concrete.
 - 2. Shop prime with universal shop primer specified in this Section or with primers specified in Section 09 9113 "Exterior Painting" and Section 09 9123 Interior Painting," unless zinc-rich primer is indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 09 9113 "Exterior Painting" and Section 09 9123 Interior Painting": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. If conditions are not satisfactory, do not begin work until unsatisfactory conditions have been corrected to the satisfaction of the Contractor and the Architect/Engineer.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Beginning of installation represents Contractor's acknowledgment and certification that all conditions are satisfactory.

3.2 PREPARATION

- A. Furnish setting drawings, diagrams, templates, instructions and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the project site.
- B. Thoroughly clean all parts which will be in contact.
- C. Paint with specified paint all surfaces of dissimilar metals and any surfaces of aluminum fabrications which will be embedded in concrete.

3.3 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Weld steel members in accordance with AWS D1.1 and comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

3.4 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for ceiling hung toilet partitions operable partitions overhead doors and overhead grilles securely to, and rigidly brace from, building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.5 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

- B. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- C. Fill bollards solidly with concrete, mounding top surface to shed water.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9113 "Exterior Painting" and Section 09 9123 Interior Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.
- D. Apply finish paints and coatings as specified in Section 09 9113 "Exterior Painting" and Section 09 9123 Interior Painting."

3.7 PROTECTION AND REPAIR OF WORK

- A. Take all measures necessary to protect the work during the life of the contract.
- B. If any portion of the work is found to be defective or is damaged by the Contractor's operations after it has been installed, it shall be repaired by the Contractor at his expense as directed by and to the satisfaction of the Architect/Engineer. If, in the opinion of the Architect/Engineer, the work has been damaged to the extent that satisfactory repairs are not possible or if repairs have been made which are not acceptable, the Contractor shall remove the damaged items and replace with new undamaged items.

END OF SECTION 05 5000

SECTION 05 5213 - PIPE AND TUBE RAILINGS**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. Steel railings.

- B. Related Requirements:

- 1. Section 05 5000 "Metal Fabrications" for non-decorative metal fabrications.
 - 2. Section 09 9600 "High-Performance Coatings" for finishing items specified in this Section.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

- 1. Primer, paint and/or coating products.
 - 2. Grout and/or anchoring cement.
 - 3. Railing brackets.

- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A company experienced in producing pipe and tube railings similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months. Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store fabricated pipe and tube railings in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
 - c. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
 - d. Uniform and concentrated loads need not be assumed to act concurrently.
 - B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Formed metal of same type of material and finish as supported rails unless otherwise indicated.
 - 1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.4 STEEL AND IRON

- A. Tubing: ASTM A 513.
- B. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.5 FASTENERS

- A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
 1. Provide fasteners for interconnecting railing components and/or for attaching them to other work as indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 1. For railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- A. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 1. **Basis-of-Design Product:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. Sherwin-Williams Company (The); Steel Spec Universal Primer, B50RV6227/B50AV8431.
 - b. Or Approved Equal.
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- C. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove flux immediately.
 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Form Changes in Direction as Follows:
 1. As detailed and by mitering at elbow bends.
- J. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- K. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

- L. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.8 STEEL AND IRON FINISHES

- A. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.
- B. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
- C. Primer Application: Apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Shop prime uncoated ferrous-metal surfaces with approved universal shop primer as indicated.
 - 2. Do not apply primer to galvanized surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of pipe and tube railings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical joints for permanently connecting railing components as indicated.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components as indicated. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

3.5 ATTACHING RAILINGS

- A. Mount railings only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.
- B. Attach railings to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets and railing end flanges to building construction as follows:
 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 2. For hollow masonry anchorage, use toggle bolts.
 3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 4. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.

3.6 ADJUSTING AND CLEANING

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 5213

SECTION 06 1053 - MISCELLANEOUS ROUGH CARPENTRY**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. Wood blocking and nailers.
2. Plywood backing panels.

B. Related Requirements:

1. Section 06 2023 "Interior Finish Carpentry" for plywood paneling and interior trim.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less; no limit for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 2. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 3. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Treatment shall not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.

4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
 1. Concealed blocking.
 2. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Furring.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content of any of the following species and grades:
 1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
 2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Screws for Fastening to Metal Framing: ASTM C1002 for non-load bearing steel framing or ASTM C 954 for cold-formed metal framing, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

- C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
 - 1. Use for exterior locations and where indicated.

2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.

- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 INSTALLATION OF WOOD FURRING

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 1053

SECTION 06 2023 - INTERIOR FINISH CARPENTRY**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. Interior trim.
- 2. Interior tongue-and-groove lumber.
- 3. Interior plywood paneling.

B. Related Requirements:

- 1. Section 06 1053 "Miscellaneous Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
- 2. Section 09 9123 "Interior Painting" for transparent finish intended for interior finish carpentry.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- D. Samples for Verification:

1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 2. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.
- B. Softwood Plywood: DOC PS 1.

2.2 INTERIOR TRIM

A. Softwood Lumber used as Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Douglas fir-larch, Douglas fir south, hem-fir, or spruce pine-fur.
2. Nominal Size: As shown on Drawings.
3. Maximum Moisture Content: 15 percent.
4. Face Surface: Surfaced (smooth).
5. Refer to Section 09 9123 "Interior Painting" for transparent finish intended for softwood lumber used for finished interior trim.

2.3 TONGUE-AND-GROOVE LUMBER

A. Softwood Lumber used for exposed ceilings for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Douglas fir-larch, Douglas fir south, hem-fir, spruce pine-fur or beetle-kill pine.
2. Nominal Size: As shown on Drawings.
3. Maximum Moisture Content: 15 percent.
4. Pattern: Tongue and groove.
5. Face Surface: Surfaced (smooth).

2.4 PLYWOOD PANELING

A. Plywood paneling: Plywood, DOC PS 1, Exterior, A-C, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness, used as finished wood paneling for Transparent Finish (Stain or Clear Finish).

1. Refer to Section 09 9123 "Interior Painting" for transparent finish intended for interior plywood paneling.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- C. Paneling Adhesive: Comply with paneling manufacturer's written instructions for adhesives.
- D. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.

1. Do not use pieces less than 24 inches long, except where necessary.
2. Stagger joints in adjacent and related standing and running trim.
3. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
4. Use scarf joints for end-to-end joints.
5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
7. Install trim after plywood paneling operations are completed.
8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
9. Fasten to prevent movement or warping.
10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 PANELING INSTALLATION

- A. Plywood Paneling: Select and arrange panels on each wall to minimize considerable variations in grain character and color between adjacent panels.
1. Install with uniform tight joints between panels.
 2. Attach panels to supports with recommended panel adhesive and fasteners.
 3. Space fasteners and adhesive as recommended by plywood manufacturer.
 4. Conceal fasteners to greatest practical extent.
- B. Tongue-and-Groove Board Paneling: Install according to manufacturer's written instructions.
1. Arrange in random-length pattern suggested by manufacturer unless boards or planks are of uniform width.
 2. Stagger end joints in random pattern to uniformly distribute joints on each surface.
 3. Install with uniform end joints. Locate end joints only over furring or blocking.
 4. Select and arrange boards on each surface to minimize noticeable variations in grain character and color between adjacent boards.
 5. Install with uniform tight joints between boards.
 6. Fasten tongue-and-groove board paneling by blind nailing through tongues.

3.6 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.7 CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 2023

SECTION 07 1113 - BITUMINOUS DAMPPROOFING**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. Cold-applied, emulsified-asphalt dampproofing.

B. Related Requirements:

- 1. Section 03 0516 "Underslab Vapor Barrier" for sheet vapor barrier and installation accessories for installation under concrete slabs-on-grade.
- 2. Section 03 3000 "Cast-in-Place Concrete" for the finishing of concrete walls and slabs to receive waterproofing.
- 3. Section 04 2000 "Unit Masonry Assemblies" for the finishing of masonry foundation walls to receive waterproofing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Applicator.

B. Product Certificates: For each type of dampproofing, patching, and plugging material.

C. Product Test Reports: For each product formulation, for tests performed by manufacturer and witnessed by a qualified testing agency.

- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying dampproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.6 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Proceed with dampproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be dampproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.
- C. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide auxiliary materials recommended in writing by manufacturer of primary materials.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

2.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Basis-of-Design: Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.

1. W. R. MEADOWS, INC.; **SEALMASTIC Emulsion**: PO Box 338, Hampshire, Illinois 60140-0338, 800-342-5976, <https://www.wrmeadows.com/>.

2. Or Approved Equal.
- B. Substitutions: See Section 01 6000 Product Requirements.
 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.
- C. Trowel Coats: ASTM D1227, Type II, Class 1.
- D. Fibered Brush and Spray Coats: ASTM D1227, Type II, Class 1.
- E. Brush and Spray Coats: ASTM D1227, Type III, Class 1.

2.4 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer, if required or recommended by dampproofing manufacturer.
- C. Asphalt-Coated Glass Fabric: ASTM D1668/D1668M, Type I.
- D. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for surface smoothness, maximum surface moisture content, and other conditions affecting performance of the Work.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.
- C. Notify Architect in writing of active leaks or defects that would affect system performance.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for dampproofing application.

- B. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- C. Clean substrates of projections and substances detrimental to dampproofing work; fill voids, seal joints, and remove bond breakers if any.
- D. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric if required or recommended by dampproofing manufacturer.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.
 - 1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where indicated as "reinforced," by embedding an 8-inch-wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

3.4 PROTECTION

- A. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where panels are subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- B. Correct dampproofing that does not comply with requirements; repair substrates, and reapply dampproofing.

END OF SECTION 07 1113

SECTION 07 1900 - WATER REPELLENTS**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 penetrating water-repellent treatments for the following vertical and horizontal surfaces:
 - 1. Concrete unit masonry.
- B. Related Requirements:
 - 1. Section 04 2000 "Unit Masonry" for integral water-repellent admixture for unit masonry assemblies and water-repellency evaluations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's printed statement of VOC content.
 - 2. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.
- A. Samples: For each type and/or color of water repellent and substrate indicated, 12 by 12 inches in size, with specified water-repellent treatment applied to half of each Sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Applicator.
- B. Product Certificates: For each type of water repellent.

- A. Preconstruction Test Reports: For substrates to receive water repellent applied under this Section, provide test reports for water repellency to Architect if not already submitted.
- A. Sample Warranties:
 - 1. Provide sample copy of Special Warranty (Manufacturer's Warranty) stating obligations, remedies, limitations, and exclusions of warranty.
 - 2. Provide sample copy of Special Project Warranty (Applicator/Installer's Workmanship Warranty) stating obligations, remedies, limitations, and exclusions of warranty.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: A qualified firm that is experienced in performing work of this section and that is eligible to receive manufacturer's special warranty.
 - 1. Applicator shall show successful completion of at least 5 projects and shall have at least five (5) years experience with installing the specified product on a project of like size and complexity.
- A. Mockups: Prepare mockups of each required water repellent on each type of substrate required to demonstrate aesthetic effects, confirm suitability, coverage rates and desired results before starting overall application and to set quality standards for materials and execution.
 - 1. Locate mockups on masonry sample panels or on existing surfaces where directed by Architect.
 - a. Size: 8 sq. ft. each or half of the masonry sample panel specified in Section 04 2000 "Unit Masonry".
 - b. Test with the same equipment, recommended surface preparation and application procedures planned for general application.
 - 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.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing: Refer to Section 04 2000 "Unit Masonry" for previously performed field testing of water-repellency for integral water-repellent admixture for unit masonry assemblies.
 - 1. In addition to verifying performance requirements, use mockups to verify manufacturer's written instructions for application procedure and optimum rates of product application to substrates.
 - 2. Propose changes to materials and methods to suit Project.

3. Notify Architect seven days in advance of the dates and times when mockups will be tested.

1.8 FIELD CONDITIONS

- A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
 1. Concrete surfaces and mortar have cured for not less than 28 days.
 2. Building has been closed in for not less than 30 days before treating wall assemblies.
 3. Ambient temperature is above 40 deg F and below 90 deg F and will remain so for 24 hours.
 4. Substrate is not frozen and substrate-surface temperature is above 40 deg F and below 90 deg F.
 5. Rain or snow is not predicted within 24 hours.
 6. Not less than seven days have passed since surfaces were last wet.
 7. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.
 8. Water-repellency Evaluation specified in Section 04 2000 "Unit Masonry" has been conducted and considered acceptable.

1.9 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Installer under requirements of the Contract Documents.
- B. Special Warranty (Manufacturer's Warranty): Manufacturer's standard form, executed by authorized company official, in which manufacturer agrees to repair or replace materials that fail to maintain water repellency through sound masonry as specified in "Performance Requirements" Article within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special Project Warranty (Applicator's/Installer's Workmanship Warranty): Submit Applicator's warranty, on Contractor's standard warranty form, notarized and signed by Applicator, covering the Work of this Section.
 1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Performance: Water repellents shall meet the following performance requirements as determined by testing on manufacturer's standard substrates representing those indicated for this Project.
- A. Water Absorption: Minimum 90 percent reduction of water absorption after 24 hours for treated compared to untreated specimens when tested according to the following:
 - 1. Concrete Masonry Units: ASTM C140.
- A. Water-Vapor Transmission: Comply with the following:
 - 1. WVT (grains/h ft²): 1.42, according to ASTM D 6490.
 - 2. Permeance: 3.47, according to ASTM D 6490.
- B. Water Penetration and Leakage through Masonry: Minimum 90 percent reduction in leakage rate of treated compared to untreated specimens, according to ASTM E 514/E 514M.
- A. Durability: Maximum 5 percent loss of water-repellent performance after 2500 hours of weathering according to ASTM G 154 compared to water-repellent-treated specimens before weathering.

2.2 PENETRATING WATER REPELLENTS

- A. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, non-staining or darkening, silane and siloxane blend with 400 g/L or less of VOCs for dense or porous masonry surfaces.
 - 1. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **PROSOCO, Inc; Siloxane WB Concentrate:** 3741 Greenway Circle, Lawrence, KS 66046, (800) 255-4255, <https://prosoco.com/>
 - b. Or Approved Equal.
- B. Substitutions: See Section 01 6000 Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

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 free from cracks and/or voids according to water-repellent manufacturer's requirements.
 - 2. Verify that surfaces are clean, dry and absorbent according to water-repellent manufacturer's requirements.
 - 3. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
 - 4. 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.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

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 and as follows:
 - 1. Concrete Unit Masonry: Remove oil, curing compounds, laitance, and other substances that inhibit penetration or performance of water repellents according to ASTM E 1857.
- C. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live vegetation.
- D. 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.
- E. 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 a saturating coating of water repellent on surfaces to be treated, from the bottom up, using a high volume, low pressure (less than 50 psi) pressure spray with a fan-type spray nozzle and adjustable pressure to avoid atomization of the material. Apply an even 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 FIELD QUALITY CONTROL

- A. Testing of Water-Repellent Material: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when water repellent is being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample water-repellent material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance of water-repellent material with product requirements.
 - 1. Owner may direct Contractor to stop applying water repellents if test results show material being used does not comply with product requirements. Contractor shall remove noncomplying material from Project site, pay for testing, and correct deficiency of surfaces treated with rejected materials, as approved by Architect.
- B. Coverage Test: In the presence of Architect, hose down a dry, repellent-treated surface to verify complete and uniform product application. A change in surface color will indicate incomplete application.
 - 1. Notify Architect seven days in advance of the dates and times when surfaces will be tested.
 - 2. Reapply water repellent until coverage test indicates complete coverage.
- C. Water-repellency Evaluation: Water Repellent Manufacturer shall inspect the installation of the water repellent for all exposed exterior masonry walls and perform a RILEM field test "Test No. II.4 Water Absorption Under Low Pressure (Pipe Method)" to measure the quantity of water absorbed by the masonry surface as follows:
 - 1. Testing shall simulate a 60 mph wind-driven rain.
 - 2. Testing Frequency: perform at least two tests for each wall surface exposed to weather.
 - 3. Readings will be made at 20 minutes for each test.

4. Perform an initial test in an inconspicuous area, such as an interior surface of an exterior wall to be concealed, whenever possible to determine whether adhesives, butyl or putty, leave oily stains or residue on the substrate.
 - 1) Perform all subsequent tests in an inconspicuous area as much as possible.
5. Select locations that can be tested at regular intervals over the service life of the structure to evaluate the repellent's service life. Results from successive tests can then be compared to indicate whether treatments (if any) remain effective or need re-application.
 - 1) Test results shall document all exact locations for future testing, if required or desired.
6. Any loss of water noted in those areas will require installation contractor to reinstall product and test those areas in the same manner.

3.5 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, as approved by Architect.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 07 1900

SECTION 07 2100 - THERMAL INSULATION**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. Extruded polystyrene foam-plastic board insulation.

B. Related Requirements:

- 1. Section 07 2111 "Pre-Engineered Building Insulation" for roof and wall batt insulation system, vapor barrier liner fabric, thermal blocks, straps, and other devices and components.
- 2. Section 09 2216 "Non-Structural Metal Framing" for sound attenuation blanket used as acoustic insulation.
- 3. Section 13 3419 "Metal Building Systems" for pre-engineered building assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

- 1. Extruded polystyrene foam-plastic board insulation.

1.4 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

- 1. Sign, date, and post the certification in a conspicuous location on Project site.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Research Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

- A. Extruded Polystyrene Board Insulation, Type IV: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - 2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
 - 3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
 - 4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - 5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 ACCESSORIES

- A. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, and/or vapor retarders, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Install insulation with manufacturer's R-value label exposed after insulation is installed.
- D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 2100

SECTION 07 2111 – PRE-ENGINEERED BUILDING INSULATION**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. Pre-Engineered Building Insulation consisting of roof and wall batt insulation, vapor barrier liner fabric, thermal blocks, straps, and other devices and components.

B. Related Requirements:

- 1. Section 07 2100 “Thermal Insulation” for foam-plastic board insulation used for cast-in-place concrete slabs and/or foundation walls.
- 2. Section 09 2216 “Non-Structural Metal Framing” for sound attenuation blanket used as acoustic insulation.
- 3. Section 13 3419 “Metal Building Systems” for pre-engineered building assemblies.
- 4. Division 21 Section on Fire Protection Systems.
- 5. Division 23 Sections on Mechanical rough-in utilities.
- 6. Division 26 Sections on Electrical rough-in utilities.

1.3 REFERENCES

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials in Sheet Form (Procedure B).
- C. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- D. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- E. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- F. ASTM C 1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

1.4 COORDINATION

- A. Coordinate installation of multi-layer pre-manufactured building roof insulation systems where the upper most layer of insulation is placed over and perpendicular to the purlins as the roof sheeting is applied. Purlins, metal roof panels and metal wall panels are specified in Section 13 3419 "Metal Building Systems."
 - 1. It is important that the insulation cavity be filled or the cavities be ventilated to minimize the probability of condensation.
- B. Coordinate installation of roof curbs, equipment supports and roof penetrations, which are specified in Section 07 7200 "Roof Accessories."

1.5 DESIGN REQUIREMENTS

- A. Thermal Resistance of Installed System: R-Value as indicated on Drawings.
- B. Insulating system shall have a continuous vapor barrier inside of building purlins, girts, and insulation to provide complete isolation from inside conditioned air.
 - 1. Taping or stapling of vapor retarder lap joints is not acceptable. Sealing field joints with a permanent vapor retarder lap sealant is required. Field seams, if any, shall be made on a structural member and mechanically attached with a steel strap and fasteners along its full length.
- C. The installed liner system shall also provide the following OSHA-required compliances to save and protect contractors, workers, inspectors, and other individuals (29 CFR-1926.751 "Controlling Contractors") from injury, penalty and liability, without added cost:
 - 1. Through fall protection (29 CFR-1926.501, 1926.760).
 - 2. Protection from falling objects (29 CFR-1926.759).
 - 3. Protection from falls through roof openings (29 CFR-1926.759).
 - 4. Product-related project safety training (29 CFR-1926.761).
 - 5. Product-related project specific safety plan (29 CFR-1926.752).

1.6 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product or component to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions.
 - 4. Detailed training instructions, project specific safety drawings, and plans for OSHA safety.
- B. Shop Drawings: Indicate locations of connections and attachments, general details, anchorages and method of anchorage and installation.

1. Show purlin spacings, support strap locations and spacings, fastening points, liner system fabric sizes and locations; insulation widths and thicknesses, sizes and locations.
- C. Samples for Verification: For each finish product specified, two samples, minimum size 6 inches square or long, representing actual products required for this project.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer.
- B. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Sample Warranties:
 1. Provide sample copy of Special Material Warranty (Insulation System Manufacturer's Warranty) stating obligations, remedies, limitations, and exclusions of warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For insulation system to include in maintenance manuals.
- B. Warranty: Submit warranty documents specified.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing product systems specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing work of this Section, with personnel trained by manufacturer on proper installation procedures.
- C. Insulation system components to include a limited material warranty as specified.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

1.11 FIELD 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.

1.12 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
- B. Special Warranty for Insulation system : Submit warranty on Manufacturer's standard form in which Manufacturer agrees to promptly repair or replace components of Insulation system, free of charge, that fail in materials within specified warranty period.
 - 1. Warranty Period: Not less than ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain insulation materials, components, and accessories from single source from single manufacturer, or as recommended or approved in writing by manufacturer of primary insulation materials.
- B. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - 1. **Thermal Design, Inc.**; ***Simple Saver System***: 601 North Main Street PO Box 468, Madison, NE 68748, (800) 255-0776, thermaldesign.com
 - 2. Or Approved Equal.
- C. Substitutions: See Section 01 6000 Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.2 SYSTEM DESCRIPTION

- A. Pre-engineered building insulation system consisting of roof and wall batt insulation, vapor barrier liner fabric, thermal blocks, straps, and other devices and components as required to provide a complete and integrated system.

2.3 MATERIALS

- A. Wall Batt Insulation: ASTM C 991 Type 1; preformed formaldehyde-free glass fiber batt conforming to the following:
1. Thermal Resistance: R-19, unless otherwise indicated on drawings.
 2. Batt Size: Equal to purlin/girt spacing by manufacturer's standard lengths.
 3. Unfaced.
 4. Other batt insulation meeting ASTM C991 Type 1, ASTM E136 and ASTM E84 as recommended and submitted by the system manufacturer and approved by the Architect during submittal is also acceptable.
- B. Roof Batt Insulation: Formaldehyde-free fiberglass batt or fiberglass blanket complying with ASTM C 991 Type 1 and ASTM E 84 with a thermal resistance and thickness as follows:
1. Thermal Resistance/Thickness: R-32 minimum for the overall roof system and full depth of cavity; unless otherwise indicated on drawings.
 - a. It is important that the insulation cavity be filled or the cavities be ventilated to minimize the probability of condensation.
 2. Roof system shall be a multilayer system.
- C. Vapor Barrier Liner Fabric: Syseal® type woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene coatings, as follows:
1. Product complies with ASTM C 1136, Types I through Type VI.
 2. Perm rating: 0.02 for fabric and for seams in accordance with ASTM E 96; or not function as a vapor retarder but shall be perforated with 3/16" minimum holes space not more than four (4) inches apart in each direction.
 3. Flame/Smoke Properties:
 - a. Class A Compliant with flame spread index 25/50 in accordance with ASTM E 84.
 - b. Self-extinguishes with field test using matches or butane lighter.
 4. Ultra violet radiation inhibitor to minimum UVMAX® rating of 8.
 5. Size and seaming: Manufactured in large custom pieces by extrusion welding from roll goods, and fabricated to substantially fit defined building area with minimum practicable job site sealing.
 6. Provide with factory double, extrusion welded seams. Stapled seams or heat-melted seams are not acceptable due to degradation of fabric.
 7. Factory-folded to allow for rapid installation.

8. Color:
 - a. White.
9. Fabric shall be certified for fall protection by the manufacturer.
- D. Vapor Barrier Lap Sealant: Solvent-based, Simple Saver polyethylene fabric adhesive.
- E. Vapor Barrier Tape: Double-sided sealant tape 3/4 inch (19 mm) wide by 1/32 inch (.79 mm) thick.
- F. Vapor Barrier Patch Tape: Single-sided, adhesive backed sealant tape 3 inches (76 mm) wide made from same material as Syseal® type liner fabric.
- G. Insulation Hangers:
 1. Preformed, rigid insulation hangers for supporting insulation between wall girts or roof purlins in roof pitches over 4:12; Thermal Design Fast-R™ or approved equal. Coiled hangers are not allowed.
- H. Thermal Breaks:
 1. Polystyrene snap-on thermal blocks; Thermal Design Snap-R or approved equal.
- I. Straps:
 1. 100 KSI minimum yield tempered, high-tensile-strength steel.
 2. Size: Not less than 0.020 inch (0.50 mm) thick by 1 inch (25 mm) by continuous length.
 3. Galvanized, primed, and painted to match specified finish color on the exposed side.
 4. Color:
 - a. White.
 5. Traverse strap pattern shall include one strap six (6) inches away from each rafter flange with the remaining space between rafters divided into equal spaces not to exceed five (5) feet. Longitudinal straps shall be nominally thirty (30) inches on-center, with two adjacent straps at the ridge line.
- J. Fasteners:
 1. For light gage steel: #12 by 3/4 (19 mm) inch plated self-drilling Tek 2 type screws with sealing washer, painted to match specified color.
 2. For heavy gage steel: #12 by 1-1/2 inch (38 mm) plated self-drilling Tek 4 type screws with sealing washer, painted to match specified color.
 3. Always install two (2) fasteners in the end of each strap for safety and to withstand installation stress, and one (1) fastener at all other designated fastening points.

2.4 EXAMINATION

- A. Verify that building structure including all bracing and any concealed building systems are completed and approved prior to installing liner system and insulation in the structure.
- B. Correct any unsatisfactory conditions before proceeding.
 - 1. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.
- C. If conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

2.5 INSTALLATION, GENERAL

- A. Install pre-engineered building insulation system in accordance with manufacturer's installation instructions and the approved shop drawings.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- D. Install in exterior spaces without gaps or voids. Do not compress insulation.
- E. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- F. Fit insulation tight in spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.

2.6 SAFETY PRECAUTIONS

- A. Installation contractor must have a site-specific safety plan and comply with all OSHA applicable local rules and regulations when installing this system.
- B. Workers must use OSHA required fall protection when installing the liner system (refer to OSHA regulations 29 CFR 1926, Subpart M).

2.7 ROOF INSULATION INSTALLATION

- A. Straps:
 - 1. Cut straps to length and install in the pattern and spacings indicated on shop drawings.
 - 2. Tension straps to required value.

B. Vapor Barrier Fabric:

1. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.
2. Position pre-folded fabric on the strap platform along one eave purlin.
3. Clamp the two bottom corners at the eave and also centered on the bay.
4. Pull the other end of the pleat-folded fabric across the building width on the strap platform, pausing only at the ridge to fasten the straps and fabric in position where plane of roof changes and to release temporary fasteners on the opposite ridge purlins.
5. Once positioned, install fasteners from the bottom side at each strap/purlins intersection.
6. Trim edges and seal along the rafters.
7. All seams must be completely sealed and stapled seams not acceptable.

C. Insulation:

1. Unpack, and shake to a thickness exceeding the specified thickness.
2. Ensure that cavities are filled completely with insulation.
3. Place on the vapor barrier liner fabric without voids or gaps.
4. Place top layer of insulation over and perpendicular to the purlins without voids or gaps, as roof sheathing is applied.
5. Place thermal block on top of purlins or bottom of purlins.
6. Place new insulation between purlins at the required thickness for the R-value specified.

- D. Seal vapor barrier fabric to the wall fabric and elsewhere as required to provide a continuous vapor barrier.

2.8 CLEANING AND PROTECTION

- A. Clean dirt or exposed sealant from the exposed vapor barrier fabric.
- B. Remove scraps and debris from the site.
- C. Protect system products until completion of installation. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- D. Repair or replace damaged products before completion of insulation system installation.

END OF SECTION 07 2111

SECTION 07 9200 - JOINT SEALANTS**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. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Mildew-resistant joint sealants.
4. Latex joint sealants.

B. Related Requirements:

1. Section 08 4113 "Aluminum-Framed Entrances and Storefronts" for glazing sealants in storefront units.
2. Section 32 1373 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- A. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation; use same designation indicated on drawings or in joint sealant schedule [**JS-##**].
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, based on evaluation of comprehensive tests performed by a qualified testing agency.
- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
 1. Joint-sealant location and designation.
 2. Manufacturer and product name.
 3. Type of substrate material.
 4. Proposed test.
 5. Number of samples required.
- D. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.
- E. Preconstruction Compatibility and Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- F. Field-Adhesion-Test Reports: For each sealant application tested.
- G. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer who has specialized in installation of work similar to that required for this project.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
 - 3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with stone, masonry or other porous substrates.
 - 4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
 - 5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
 - 7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each kind of sealant and joint substrate.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. If required to receive warranty specified, arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.8 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

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: One year from date of Substantial Completion.
- B. 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: Twenty (20) years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, T: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use T.
 - 1. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Dow Corning Corporation; 888.**
 - b. Or Approved Equal.
 - 2. Substitutions: See Section 01 6000 Product Requirements.
 - a. For any product not identified as "Basis of Design", submit information as specified for substitutions.
 - 3. Coordinate with Section 32 1373 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.
- B. Silicone, S, P, 100/50, T [**JS-#I**]: Single-component, pourable, self-leveling, plus 100 percent and minus 50 percent movement capability, traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 100/50, Use T.
 - 1. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Dow Corning Corporation; 890-SL.**
 - b. Or Approved Equal.
 - 2. Substitutions: See Section 01 6000 Product Requirements.

- a. For any product not identified as "Basis of Design", submit information as specified for substitutions.
3. Coordinate with Section 32 1373 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 100/50, T, NT [**JS-#2**]: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.
 1. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Dow Corning Corporation; 790 Silicone Building Sealant.**
 - b. Or Approved Equal.
 2. Substitutions: See Section 01 6000 Product Requirements.
 - a. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew-Resistant, Non-Staining, Neutral-Curing, S, NS, 50 NT [**JS-#3**]: Mildew-resistant, non-staining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
 1. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Pecora Corporation; Pecora 898NST.**
 - b. Or Approved Equal.
 2. Substitutions: See Section 01 6000 Product Requirements.

- a. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.5 LATEX JOINT SEALANTS

- A. Acrylic Latex [**JS-#4**]: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 1. **Basis-of-Design**: Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Pecora Corporation; Pecora AC-20.**
 - b. Or Approved Equal.
 2. Substitutions: See Section 01 6000 Product Requirements.
 - a. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.6 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), 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.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 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, free of oily residues or other substances capable of staining or

harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. 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. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 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 of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to

comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- 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.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings 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. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. 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 C 1193 unless otherwise indicated.
 - 2. Provide flush joint profile where indicated according to Figure 8B in ASTM C 1193.

3. Provide recessed joint configuration of recess depth and at locations indicated according to Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 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 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
1. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
2. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
3. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
4. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

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.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces [**JS-#1**].
 - 1. Joint Locations:
 - a. Expansion, contraction, control, and isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 1. Joint Sealant: Silicone, S, P, 100/50, T.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces [**JS-#2**].
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between metal panels.
 - d. Joints between different materials listed above.
 - e. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - f. Other joints as indicated.
 - 2. Joint Sealant: Silicone, Nonstaining, S, NS, 100/50, T, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement [**JS-#3**].
 - 1. Joint Locations:

- a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - c. Other joints as indicated.
2. Joint Sealant: Acrylic latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces [**JS-#4**].
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Other joints as indicated on Drawings.
 2. Joint Sealant: Silicone, Mildew-Resistant, Non-Staining, Neutral-Curing, S, NS, 50, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 9200

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES**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. Interior custom hollow-metal doors and frames.
- 2. Exterior custom hollow-metal doors and frames.

- B. Related Requirements:

- 1. Section 08 7100 "Door Hardware" for door hardware for doors installed in hollow metal frame assemblies.
- 2. Section 08 8000 "Glazing" for non-fire-resistant glass in glazed openings in doors and frames.
- 3. Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting" for field painting hollow metal doors and frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.
- B. Custom Hollow Metal Work: Hollow metal work fabricated according to NAAMM-HMMA 861.

1.4 COORDINATION

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.
- B. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

- C. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.
 - 9. Details of conduit and preparations for power, signal, and control systems.
 - 10. Indicated finish requirements for each frame and door type.
- C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Oversize Construction Certification: For assemblies required to be fire-rated and exceeding limitations of labeled assemblies.
- B. Manufacturer's Qualification Statement.
- C. Installer's Qualification Statement.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- C. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- D. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Ceco Door; ASSA ABLOY.
 - 2. Curries Company; ASSA ABLOY.
 - 3. Republic Doors and Frames.
 - 4. Steelcraft; an Allegion brand.
- B. Substitutions: See Section 01 6000 Product Requirements.

For any product not identified as "Basis of Design", submit information as specified for substitutions.
- C. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

2.2 INTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

- A. Commercial Doors and Frames: NAAMM-HMMA 861; SDI A250.4, Physical Performance Level A.
 - 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Uncoated steel sheet, minimum thickness of 0.042 inch.

- d. Edge Construction: Continuously welded with no visible joints or seams on exposed faces.
 - e. Edge Bevel:
 - 1) Vertical Edges for Single-Acting Doors: Beveled 1/8-inch in 2-inches.
 - 2) Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
 - f. Top Edge Closures: Close top edges of doors with flush or inverted end closures of same material and gage thickness as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material and gage thickness as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. Core: Manufacturer's standard Kraft-paper honeycomb, Polyisocyanurate, Polystyrene, Polyurethane, Laminated mineral board, or Vertical steel stiffener core at manufacturer's discretion to meet the performance criteria indicated.
2. Frames:
- a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide.
 - b. Sidelite and Transom Frames: Fabricated from same material as adjacent door frame.
 - c. Construction: Full profile welded.
 - d. Grout Guards: Provide 0.016-inch thick, steel sheet grout guards (mortar boxes, plaster guards, dust boxes) to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
3. Exposed Finish: Prime.

2.3 EXTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

- A. Commercial Doors and Frames: NAAMM-HMMA 861; SDI A250.4, Physical Performance Level A.
- 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60 or A60 coating.
 - d. Edge Construction: Continuously welded with no visible joints or seams on exposed faces.
 - e. Edge Bevel:

- 1) Vertical Edges for Single-Acting Doors: Beveled 1/8-inch in 2-inches.
 - 2) Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
- f. Top Edge Closures: Close top edges of doors with flush or inverted end closures of same material and gage thickness as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material and gage thickness as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. Core Construction: Provide thermal-resistance-rated cores for exterior hollow-metal doors.
 - 1) Manufacturer's standard Kraft-paper honeycomb, Polyisocyanurate, Polystyrene, Polyurethane, Laminated mineral board, or Vertical steel stiffener core at manufacturer's discretion to meet the performance criteria for thermal-resistance-rated (insulated) doors indicated under Part 2 Performance Requirements.
 - i. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 861 with reinforcing plates from same material as door face sheets.
2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide; with minimum G60 or A60 coating.
 - b. Construction: Full profile welded.
 - 1) Frames exposed to exterior weather conditions shall be watertight.
 - c. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 861 with reinforcing plates from same material as frame.
 - d. Head Reinforcement: Provide minimum 0.093-inch- thick, steel channel or angle stiffener for opening widths more than 48 inches.
 - e. Grout Guards: Provide 0.016-inch thick, steel sheet grout guards (mortar boxes, plaster guards, dust boxes) to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
 3. Exposed Finish: Prime.

2.4 BORROWED LITES

- A. Fabricate of uncoated steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide.

- B. Construction: Full profile welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated unless otherwise indicated below:
 - a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - c. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - d. Postinstalled Expansion Anchor for Cast-In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed from same material as frames, not less than 0.042-inch thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
- C. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.6 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.7 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material and gage as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8-inch high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032-inch thick, fabricated from same material and gage as frames in which they are installed.
- D. Terminated (Hospital) Stops: Where indicated on interior door frames, terminate stops 6-inches above finish floor with a 90-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

2.8 LOUVERS

- A. Provide sight proof louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.

2.9 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS); Type B with minimum A40 metallic coating.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Grout: Masonry grout complying with ASTM C 476, except with a maximum slump of 4-inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. densit; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- J. Glazing: Comply with requirements in Section 08 8000 "Glazing."

2.10 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.11 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.
- C. Hollow Metal Doors:
 - 1. Glazed Lites: Factory cut openings in doors.
- D. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

- E. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
1. Welded Frames: Continuously weld full profile; grind, fill, dress, and make smooth, flush, and invisible.
 2. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inch high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - c. Compression Type: Not less than two anchors in each jamb.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

- F. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- G. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule, and templates furnished as specified in Division 08 Section "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/NAAMM-HMMA 861.
 - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
- H. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
 - 2. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - 3. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 4. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 5. Provide loose stops and moldings on inside of hollow-metal doors and frames.
 - 6. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
 - 7. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.12 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately following cleaning and pretreating.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
- B. Field Painting: Refer to Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting" for field painting hollow metal doors and frames.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
- D. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.3 INSTALLATION

- A. General: Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with NAAMM-HMMA 840.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable glazing stops located on secure side of opening.
 - c. Install door silencers in frames before grouting.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - f. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
2. Fire-Rated Openings: Install frames according to NFPA 80.
3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
4. Metal Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with masonry grout.
6. Concrete Walls: Solidly fill space between frames and concrete with masonry grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
7. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
9. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
10. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

- c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
 - 1. Non-Fire-Rated Steel Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 08 8000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

3.5 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 1113

SECTION 08 3113 - ACCESS DOORS AND FRAMES**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 access doors and frames for walls and ceilings.
- B. Related Requirements:
 - 1. Division 21, 22, and 23 sections for concealed fire protection, plumbing and mechanical equipment requiring access.
 - 2. Divisions 26 Sections for concealed electrical equipment requiring access.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.
- C. Product Schedule: For access doors and frames.

PART 2 - PRODUCTS

- A. **Basis-of-Design Product:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Nystrom, Inc.:** 9300 73rd Avenue North, Minneapolis, MN 55428, (800) 547-2635, <http://www.nystrom.com/>
 - b. Or Approved Equal.

- B. Source Limitations: Obtain access doors and panels from single source from single manufacturer.

2.2 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Exposed Flanges (Non-rated) for galvanized sheet metal, plywood paneling and tongue-and-groove wood surfaces:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Nystrom, Inc.; *NT, Architectural:*** 9300 73rd Avenue North, Minneapolis, MN 55428, (800) 547-2635, <http://www.nystrom.com/>
 - b. Or Approved Equal.
2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Locations: Wall.
4. Door Size: As indicated in drawings or as required by type of access.
5. Stainless-Steel Sheet:
 - a. Door Material: Nominal 0.063 inch (1.6 mm), 16 gauge.
 - b. Frame Material: Nominal 0.063 inch (1.6 mm), 16 gauge.
 - c. Finish: Type 304, stainless-steel, No. 4 finish.
6. Hinges: Concealed spring, button type, to allow for door removal.
7. Latch and Lock: Cam latch, key operated.
8. Options: Gasketing.

- B. Recessed Access Doors with Concealed Flanges (Non-rated) for wall board surfaces:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Nystrom, Inc.; *RW, wall board surfaces:*** 9300 73rd Avenue North, Minneapolis, MN 55428, (800) 547-2635, <http://www.nystrom.com/>
 - b. Or Approved Equal.
2. Description: Door face recessed 5/8-inch for gypsum board infill; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Wall and ceiling.
4. Door Size: As indicated in drawings or as required by type of access.
5. Galvanized Steel Sheet:
 - a. Door Material: Nominal 0.064 inch, 16 gauge.
 - b. Frame Material: Nominal 0.064 inch, 16 gauge. Provide 1/4-inch mounting holes.
 - c. Finish: Paintable White; powder-coat.

6. Latch and Lock: Cam latch, key operated.

2.3 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 304 or Type 316. Remove tool and die marks and stretch lines, or blend into finish.
- E. Stainless Steel Flat Bars: ASTM A666, Type 304 or Type 316. Remove tool and die marks and stretch lines, or blend into finish.
- F. Aluminum Extrusions: ASTM B221, Alloy 6063.
- G. Aluminum Sheet: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- H. Frame Anchors: Same material as door face.
- I. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. 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.
- C. 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.
 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.

- E. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to securely hold door(s) in flush, smooth plane when closed.
 - 2. Keys: Furnish two keys per lock and key all locks alike.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. 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.
- E. Stainless Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finish: ASTM A480/A480M No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 3113

SECTION 08 3613 - SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, manually operated.
- B. Operating hardware and supports.

1.02 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 2022.
- B. 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 2004 (Reapproved 2012).
- C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).
- D. DASMA 102 - American National Standard Specifications for Sectional Doors 2018.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Operation Data: Include normal operation, troubleshooting, and adjusting.
- H. Maintenance Data: Include data for transmission, shaft and gearing, lubrication frequency, spare part sources.

- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Comply with applicable code for motor and motor control requirements.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sectional Doors:
 1. Amarr; Amarr 2747 Polyurethane Insulated Steel
Door: www.amarr.com/commercial/#sle.
 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 STEEL DOORS

- A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 2. Door Nominal Thickness: 2 inches thick.
 3. Thermal Transmittance: U-factor of 0.31 Btu/hr sq ft degrees F, maximum, in accordance with DASMA 102.
 4. Air Leakage Rate: Less than 0.40 cfm/sf when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf.

5. Exterior Finish: Factory finished with acrylic baked enamel; color as selected by Architect.
 6. Interior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
 7. Manual Operation: Pull rope.
- B. Door Panels: Steel construction; outer steel sheet of 20 gauge, 0.0359 inch minimum thickness, flush profile; inner steel sheet of 20 gauge, 0.0359 inch minimum thickness, flat profile; core reinforcement ___ inch sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.

2.03 COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
 1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.
- I. Lock Cylinders: See Section 08 7100.

2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Insulation: Foamed-in-place polyurethane, bonded to facing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

3.06 CLEANING

- A. Clean doors and frames.
- B. Remove temporary labels and visible markings.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 4113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**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. Storefront framing.
- 2. Manual-swing entrance doors and door-frame units.

B. Related Requirements:

- 1. Section 07 9200 "Joint Sealants" for joint sealant used during installation at perimeter of aluminum-framed systems to other materials.
- 2. Section 08 7100 "Door Hardware" for door hardware to be provided for entrance doors specified in this Section.
- 3. Section 08 8800 "Glazing" for non-fire-resistant glazing for windows, doors, interior borrowed lites, and storefront framing.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
 4. Include point-to-point wiring diagrams showing the following:
 - a. Power requirements for each electrically operated door hardware.
 - b. Location and types of switches, signal device, conduit sizes, and number and size of wires.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
 1. Joinery, including concealed welds.
 2. Anchorage.
 3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.
- E. Entrance Door Hardware Schedule: Prepared by or under 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.
- F. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer and testing agency.
 - B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
 - C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
 - D. Source quality-control reports.
 - E. Field quality-control reports.
 - F. Sample Warranties: For special warranties.
- 1.7 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.
- 1.8 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
 - B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
 - C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- 1.9 PROJECT CONDITIONS
- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
- 1.10 WARRANTY
- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.

- B. **Manufacturer's Special Warranty:** Submit a written warranty on Manufacturer's standard form in which Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts due to defective materials within specified warranty period.
1. **Warranty Period:** One year from date of Substantial Completion.
- C. **Installer's Special Warranty:** Submit a written warranty in form acceptable by Owner in which Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship 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 created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water penetration through fixed glazing and framing areas.
 - f. Failure of operating components.
 2. **Warranty Period:** One year from date of Substantial Completion.
- D. **Special Finish Warranty:** Manufacturer's standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. **Warranty Period:** Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
1. **Kawneer North America, an Arconic company:** 555 Guthridge Court, Norcross GA 30092, (770) 449-5555, <https://www.kawneer.com/>.
 2. Or Approved Equal.
- B. **Source Limitations:** Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Glass breakage.
 - e. Noise or vibration created by wind and thermal and structural movements.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
 - h. Failure of operating units.
- C. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
 - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
- E. Structural: Test according to ASTM E 330/E 330M as follows:
 - 1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.

2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 2. Entrance Doors:
 - a. Single Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 - b. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
- H. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.
- I. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than **0.42 Btu/sq. ft. x h x deg F** as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient (SHGC): Fixed glazing and framing areas as a system shall have SHGC of no greater than **0.26** as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC-certified condensation resistance rating of no less than **58** as determined according to NFRC 500.
- J. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

- K. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

2.3 STOREFRONT SYSTEMS

- A. **Basis-of-Design Product:** Storefront system product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
1. **Kawneer North America, an Arconic company; Trifab™ VG 451T Framing System:** 555 Guthridge Court, Norcross GA 30092, (770) 449-5555, <https://www.kawneer.com/>.
 2. Or Approved Equal.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Exterior Framing Construction: Thermally broken.
 2. Interior Vestibule Framing Construction: Nonthermal.
 3. Glazing System: Retained mechanically with gaskets on four sides.
 4. Glazing Plane: Front.
 5. Finish: Clear anodic finish.
 6. Fabrication Method: Field-fabricated stick system.
 7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 8. Steel Reinforcement: As required by manufacturer.
- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 ENTRANCE DOOR SYSTEMS

- A. **Basis-of-Design Product:** Entrance door system product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
1. **Kawneer North America, an Arconic company; 500 Series Swing Entrance Door:** 555 Guthridge Court, Norcross GA 30092, (770) 449-5555, <https://www.kawneer.com/>.
 2. Or Approved Equal.
- B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design:
 - a. Top Rail: 5-inch nominal width.
 - b. Vertical Stiles: Wide stile; 5-inch nominal width.
 - c. Mid Rail for Panic Hardware: 8-inch nominal width.
 - d. Bottom Rail: 10-inch nominal width.
3. Glazing Stops and Gaskets: Manufacturer's standard, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: As specified in Section 08 7100 "Door Hardware."

2.6 GLAZING

- A. Glazing: Comply with Section 08 8000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

2.7 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 4. Structural Profiles: ASTM B 308/B 308M.
- B. Steel Reinforcement:
 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
 4. Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and

pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

2.8 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07 9200 "Joint Sealants."
- E. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- F. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.9 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 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 from exterior.
 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Storefront Framing: Fabricate components for assembly using manufacturer's standard system.
- F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At interior and exterior doors, provide compression weather stripping at fixed stops.
- G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 2. At exterior doors, provide weather sweeps applied to door bottoms.
- H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed, as specified in Section 07 9200 "Joint Sealants," to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Section 08 8000 "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter sealant as specified in Section 07 9200 "Joint Sealants" to produce a weathertight installation and as follows:

1. Seal joints with sealant per manufacturer's recommendations, allow for "weeping" to the exterior of the system - shim jamb and sill members with metal or plastic to maintain adequate space for sealants as indicated in the drawings.
2. Do not seal perimeter of storefront system to adjoining exterior finish material where removable face occurs; do not seal the trim to the frame.

3.3 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.
5. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
 1. Test a minimum of two areas on each building facade per sealant batch or lot number.
 2. Repair installation areas damaged by testing.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
 1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

END OF SECTION 08 4113

SECTION 08 6200 - TUBULAR SKYLIGHTS**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. Tubular skylights, consisting of skylight dome, reflective tube, and diffuser assembly.
- B. Related Requirements:
 - 1. Section 13 3419 "Metal Building Systems" for pre-engineered building assemblies.

1.3 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights 2022.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- C. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2022.
- D. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings 2020a.
- E. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings Current Edition, Including All Revisions.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of unit skylight.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for tubular skylights.
- B. Shop Drawings: For tubular skylight work.

1. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.
 2. Manual Operators: Show locations, mounting, and details for installing operator components and controls.
- C. Aluminum Finish Samples: For each type of exposed finish required, in a representative section of each tubular skylight in manufacturer's standard size.
- D. Glazing Samples: For each color and finish of glazing indicated, 12 inches square and of same thickness indicated for the final Work.
- E. Product Schedule: For tubular skylights.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For qualified Installer and manufacturer.
- B. Product Test Reports: For each type and size of unit skylight, for tests performed within the last four years by a qualified testing agency. Test results based on testing of smaller unit skylights than specified will not be accepted.
- C. Field quality-control reports.
- D. Sample Warranty: For special warranty.
- 1.6 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For tubular skylights to include in maintenance manuals.
- 1.7 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A manufacturer capable of fabricating tubular skylights, engaged in manufacture of tubular daylighting devices for a minimum of twenty (20) years, that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to tubular skylight manufacturer for installation of units required for this Project.
- 1.8 WARRANTY
- A. Special Warranty: Manufacturer agrees to repair or replace components of tubular skylights that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Uncontrolled water leakage.

- b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Yellowing of acrylic glazing.
2. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 1. **Solatube International, Inc; SolaMaster:** 2210 Oak Ridge Way, Vista, CA 92081, 888-765-2882, www.solatube.com/#sle
 2. Or Approved Equal.
- B. Source Limitations: Obtain all components of tubular skylights and accessories from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Tubular Skylight Standard: Comply with AAMA/WDMA/CSA 101/IS.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 1. Certification: AAMA-, WDMA-, or CSA-certified tubular skylights with label attached to each.
- B. Daylight Reflective Tubes: Spectralight Infinity with Cool Tube Technology combines ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields an average total- and specular-reflectance greater than 99.5% percent for the Visible Light spectrum (400 nm to 700 nm) providing maximized visible light transmission and less than 25% reflectance for Infrared (IR) heat wavelengths (750 nm to 2500 nm) for minimized heat transmission, resulting in a spectrally-selective Total Solar Spectrum (250 nm to 2500 nm) reflectance less than 37 percent, as measured using a Perkin Elmer Lambda 1050 spectrophotometer with a Universal Reflectance Accessory. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
- C. SOLAMASTER 750 DS-O (OPEN CEILING)
 1. AAMA/WDMA/CSA 101/IS2/A440, Class CW-PG70, size tested 21 inch (533 mm) diameter, Type TDDOC and Type TDDCC.

- a. Air Infiltration Test:
 - 1) Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
 - a. Water Resistance Test:
 - 1) Passes water resistance; no uncontrolled water leakage with a pressure differential of 10.7 psf (512 Pa) or 15 percent of the design load (whichever is greater) and a water spray rate of 5 gallons/hour/sf for 24 minutes when tested in accordance with ASTM E 547 and ASTM E 331.
 - b. Uniform Load Test: All units tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
 - 1) No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 70 psf (3.35 kPa).
2. Fire Testing:
- a. Fire Rated Roof Assemblies:
 - 2) When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the International Building Code for Class A, B, and C roof assemblies.
 - b. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the International Building Code.
 - c. Self-Ignition Temperature - Greater than 650 degrees F per ASTM D-1929.
 - d. Smoke Density: Rating no greater than 450 per ASTM Standard E 84 in way intended for use. Classification C.
 - e. Rate of Burn and/or Extent: Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2 per ASTM D 635.
 - f. Rate of Burn and/or Extent: Maximum Burn Extent: 1 inch (25 mm) Classification CC-1 per ASTM D 635.
3. Fall Protection Performance:
4. Passes fall protection test: No penetration of dome or curb cap when subject to 400 lb (160 Kg)/42 inch (1066 mm) impact drop test when tested in accordance with OSHA 29 CFR 1926.506(c) Safety Net Systems.
5. Blast Resistance: ASTM F1642, ASTM F2912, GSA-TS01-2003, and UFC 4-010-01:
- a. Airblast Loading ASTM Hazard Rating: Passes: No Hazard Rating
 - b. Airblast Loading UFC Level of Protection: Passes Medium Level of Protection
 - c. Dynamic Overpressure Loading ASTM Hazard Rating: Passes: No Hazard Rating
 - d. Dynamic Overpressure Loading UFC Level of Protection: Passes Medium Level of Protection

2.3 TUBULAR SKYLIGHTS

- A. General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16.
- B. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
1. **Solatube International, Inc; SolaMaster Solatube Model 750 DS-O, 21 inch:** 2210 Oak Ridge Way, Vista, CA 92081, 888-765-2882, www.solatube.com/#sle
 2. Or Approved Equal.
 3. Model: Solatube Model 750 DS-O Open Ceiling. AAMA Type TDDOC.
 4. Capture Zone:
 - a. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - 3) Outer Dome Glazing: Type DA, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend.
 - (a) Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
 5. Dome Options:
 - a. Dome Edge Protection Band for Curb Cap: Type PBC, for fire rated Class A, B or C roof applications with 750 DS Domes on Curb Cap Flashing installations. Galvanized steel. Nominal thickness of 0.039 inch (1 mm). For use with Curb Cap Flashing (Type FC), only.
 6. Flashings:
 - a. Roof Flashing Base:
 - 4) One Piece: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube. Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M or ASTM A 792/A 792M, 0.028 inch (0.7 mm) plus or minus .006 inch (.015 mm) thick.
 - (a) Base Style: Type FC, Curb cap, with inside dimensions of 27 inches by 27 inches (685 mm by 685 mm) to cover curb as specified in Section 077210.
 - b. Flashing Options:
 - 5) Curb Cap Insulation: Type CCI, Nominal 1 inch thick thermal insulation pad to reduce thermal conduction between curb-cap and tubing and thermal convection between room air and curb-cap. Rated R-6 (OFxft2xhr/Btu) Insulation is Polyisocyanurate foam utilizing CFC, HCFC, & HFC free blowing agent. Type-1 Class-1 per ASTM C

1289; Passes UL 1715 (15-minute thermal barrier per IBC 2603.4); Attic ventilation may be required per IBC 1203.2(OFxft2xhr/Btu).

7. Transfer Zone:

- a. Extension Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm) conforming to ASTM B 209.
 - 6) Reflective Tubes:
 - (a) Reflective extension tube, Type EXX and Type EL with total length of run as indicated on the Drawings.
 - (b) Interior Finish: Spectralight Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance.
 - 7) Tube Options
 - (a) Top Tube Angle Adapter and Bottom Tube Angle Adapter Kit: Type AK, Reflective 45 degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long.

8. Delivery Zone:

- a. Diffuser Assemblies for Tubes Not Penetrating Ceilings (Open Ceiling): Solatube Model 750 DS-O. 21 inch (530 mm) diameter diffuser attached directly to bottom of tube.
 - 8) Lens: Type L1, OptiView Fresnel lens design to maximize light output and diffusion. Visible Light Transmission shall be greater than 90 percent at 0.022 inch (0.6 mm) thick. Classified as CC2.

2.4 ACCESSORY MATERIALS

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.
- C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

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 the Work.
 - 1. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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. 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 tubular skylights.
- C. Install tubular skylights level, plumb, and true to line, without distortion.
- D. Anchor tubular skylights securely to supporting substrates.
- E. Where aluminum surfaces of tubular skylights will contact another metal or corrosive substrates, such as preservative-treated wood, apply bituminous coating on concealed metal surfaces or provide other approved permanent separation recommended in writing by tubular skylight manufacturer.

3.4 FIELD QUALITY CONTROL

- A. 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.
- B. Perform test for total area of each tubular skylight.
- C. Work will be considered defective if it does not pass tests and inspections.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 08 6200

SECTION 08 7100 – DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: Mechanical and electrified door hardware.
- B. Related Sections:
 - 1. Division 06 Section "Rough Carpentry."
 - 2. Division 06 Section "Finish Carpentry."
 - 3. Section 07 9200 "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
 - 4. Section 08 1113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
 - 5. Section 08 3113 "Access Doors and Frames" for access door hardware.
 - 6. Section 08 3613 "Sectional Doors" for door hardware provided as part of sectional door assemblies.
 - 7. Section 08 4113 "Aluminum-Framed Entrances and Storefronts".
 - 8. Section 10 1423 "Panel Signage" for hardware provided as part of signage.
 - 9. Section 10 2800 "Toilet, Bath, and Laundry Accessories for hardware provided as part of toilet, bath, and laundry accessories.

1.02 REFERENCES

- A. UL - Underwriters Laboratories
 - 1. UL 10B - Fire Test of Door Assemblies
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies
 - 4. UL 305 - Panic Hardware
- B. DHI - Door and Hardware Institute
 - 1. Sequence and Format for the Hardware Schedule
 - 2. Recommended Locations for Builders Hardware
 - 3. Keying Systems and Nomenclature
 - 4. Installation Guide for Doors and Hardware
- C. NFPA – National Fire Protection Association
 - 1. NFPA 70 – National Electric Code
 - 2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
 - 3. NFPA 101 – Life Safety Code
 - 4. NFPA 105 – Smoke and Draft Control Door Assemblies
 - 5. NFPA 252 – Fire Tests of Door Assemblies
- D. ANSI - American National Standards Institute
 - 1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities

2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

- A. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
 1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 3. Door Hardware Schedule: Submit with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI. Indicate complete designations of each item required for each door or opening, include all notes and operational descriptions from hardware groups.
 4. Key Schedule: After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 5. Templates: After final approval of hardware schedule, provide for doors, frames and other work specified to be factory or shop prepared for door hardware installation.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 1. Supplier: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project.
 2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
- B. Certifications:
 1. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80, UL 10C, and requirements of authorities having jurisdiction.
 2. Smoke and Draft Control Door Assemblies: Provide door hardware that meets requirements of assemblies tested according to UL 1784 and NFPA 105.
 3. Accessibility Requirements: This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping. Deliver keys to manufacturer of key control system for subsequent delivery to Owner

- B. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

1.06 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant. Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- C. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide products from manufacturers listed in hardware groups. Additional alternate products require prior written approval from Owner and are contingent upon those products providing all functions, features, and meeting all requirements of scheduled manufacturer's product.

Item	Scheduled Manufacturer	Acceptable Manufacturer
Hinges	Ives (IVE)	Hager, Bommer, Stanley
Continuous Hinges	Ives (IVE)	Markar, Stanley
Electric Power Transfer	Von Duprin (VON)	ABH
Locksets & Deadlocks	Schlage (SCH)	No Substitute
Exit Devices & Mullions	Von Duprin (VON)	No Substitute
Cylinders & Keying	Schlage (SCH)	No Substitute
Door Closers	LCN (LCN)	No Substitute
Door Trim	Ives (IVE)	Burns, Rockwood
Protection Plates	Ives (IVE)	Burns, Rockwood
Overhead Stops	Glynn-Johnson (GLY)	Rixson, Sargent
Stops & Holders	Ives (IVE)	Burns, Rockwood
Thresholds & Weatherstrip	Zero (ZER)	Pemko, National Guard
Silencers	Ives (IVE)	Burns, Rockwood
Key Cabinets	Telkee (TEL)	HPC, Lund

2.02 MATERIALS

- A. Provide hardware with options specified in the hardware sets, fasteners provided by hardware manufacturer, strikes provided by hardware manufacturer, drop plates, special templates, and other devices necessary for proper hardware installation.
- B. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.
- C. Provide each electrified hardware item and wire harnesses with enough and wire gauge with standardized Molex plug connectors to accommodate electric function of specified hardware.

2.03 HINGES: IVES 5BB SERIES

- A. Provide 5-knuckle plain bearing hinges conforming to ANSI/BHMA A156.1. Provide hinges in the size, quantity, weight, and base metal according to manufacturer's published recommendations. Provide non-removable pins at out-swinging lockable doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.

2.04 CONTINUOUS HINGES: IVES

- A. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1 and fabricated from 6063-T6 aluminum. Size hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length.

2.05 CYLINDRICAL LOCKS: SCHLAGE ND SERIES – MATCH EXISTING COUNTY BUILDINGS

- A. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.

2.06 EXIT DEVICES: VON DUPRIN 99/33A SERIES - MATCH EXISTING COUNTY BUILDINGS

- A. Provide grooved touchpad exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware. Touchpad must extend a minimum of one half of door width. Provide exit devices cut to door width and height with flush end caps. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.07 KEYING:

- A. Provide cylinders/cores keyed into Owner's existing keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
 - 1. Quantity: Furnish in the following quantities.

- a. Change (Day) Keys: 3 per cylinder/core.
- b. Permanent Control Keys: 3.
- c. Master Keys: 2.
- d. Construction Keys: 12

2.08 KEY CONTROL SYSTEM: TELKEE

- A. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.

2.09 SURFACE CLOSERS: LCN 4000 HANDED - MATCH EXISTING COUNTY BUILDINGS

- A. Provide cast iron door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles.

2.10 DOOR TRIM: IVES

- A. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.11 PROTECTION PLATES: IVES

- A. Provide protection plates with beveled four edges as scheduled. Size plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.12 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS: GLYNN-JOHNSON

- A. Provide overhead stop at doors where specified and where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.13 DOOR STOPS AND HOLDERS: IVES

- A. Provide door stops at each door leaf. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn. Where a wall stop cannot be used, provide universal floor stops. Where wall or floor stop cannot be used, provide overhead stop. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.14 THRESHOLDS, WEATHERSTRIPPING, AND GASKETING: ZERO INTERNATIONAL

- A. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items. Where smoke- and draft-control door

assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

2.15 SILENCERS: IVES

- A. Provide "push-in" type silencers for hollow metal or wood frames. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame. Omit where gasketing is specified.

2.16 LATCH PROTECTORS: IVES

- A. Provide stainless steel latch protectors of type required to function with specified lock.

2.17 FINISHES

- A. Provide hardware with finishes as indicated in hardware sets.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Where on-site modification of doors and frames is required, prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 1. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 2. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 3. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.

3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install hardware in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
 - C. Lock Cylinders: Install construction cores to secure building and areas during construction period. Replace construction cores with permanent cores as indicated in keying section. Furnish permanent cores to Owner for installation.
 - D. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
 - E. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
 - F. Stops: Do not mount floor stops where they may impede traffic or present tripping hazard.

3.04 FIELD QUALITY CONTROL

- A. Provide functional testing and inspection of fire door assemblies and required egress door assemblies by a qualified person in accordance with NFPA 80 and NFPA 101.
- B. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- C. Clean adjacent surfaces soiled by door hardware installation. Clean operating items per manufacturer's instructions to restore proper function and finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:












Abbreviation	Name
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

HARDWARE SET: 01

DOOR NUMBER:

101A

EACH TO HAVE:

2	EA	CONT. HINGE	112XY		628	IVE
1	EA	REMOVABLE MULLION	KR4954-STAB-ANGLE PLATE		689	VON
2	EA	PANIC HARDWARE	99-DT		626	VON
1	EA	MORTISE CYLINDER	20-061 ICX		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
2	EA	OH STOP	90S SHIM2		630	GLY
2	EA	SURFACE CLOSER	4021		689	LCN
2	EA	FLUSH CEILNG MTG PLATE	4020-18G SRT		689	LCN
1	EA	MULLION SEAL	8780N X D.H.		BK	ZER
2	EA	DOOR SWEEP	39A X D.W.		A	ZER
1	EA	THRESHOLD	8655A X D.W.		A	ZER
1	SET	SEALS	BY ALUM DOOR/FRAME MFG			














INSTALL OH STOP BEFORE INSTALLING DOOR CLOSER

HARDWARE SET: 02

DOOR NUMBER:

101B

EACH TO HAVE:

2	EA	CONT. HINGE	112XY		628	IVE
1	EA	REMOVABLE MULLION	KR4954-STAB-ANGLE PLATE		689	VON
1	EA	PANIC HARDWARE	99-DT		626	VON
1	EA	PANIC HARDWARE	99-NL		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX		626	SCH
2	EA	FSIC CORE	23-030		626	SCH
2	EA	OH STOP	90S SHIM2		630	GLY
2	EA	SURFACE CLOSER	4021		689	LCN
2	EA	FLUSH CEILING MTG PLATE	4020-18G SRT		689	LCN
1	EA	MULLION SEAL	8780N X D.H.		BK	ZER
2	EA	DOOR SWEEP	39A X D.W.		A	ZER
1	EA	THRESHOLD	8655A X D.W.		A	ZER
1	SET	SEALS	BY ALUM DOOR/FRAME MFG			











INSTALL OH STOPS BEFORE INSTALLING DOOR CLOSERS

HARDWARE SET: 03

DOOR NUMBER:

101C 101D

EACH TO HAVE:

2	EA	CONT. HINGE	112XY		628	IVE
1	EA	REMOVABLE MULLION	KR4954-STAB-ANGLE PLATE		689	VON
2	EA	PANIC HARDWARE	99-L-06		626	VON
2	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX		626	SCH
3	EA	FSIC CORE	23-030		626	SCH
2	EA	OH STOP	90S SHIM2		630	GLY
2	EA	SURFACE CLOSER	4021		689	LCN
2	EA	FLUSH CEILING MTG PLATE	4020-18G SRT		689	LCN
1	EA	MULLION SEAL	8780N X D.H.		BK	ZER
1	SET	SEALS	BY ALUM DOOR/FRAME MFG			










INSTALL OH STOPS BEFORE INSTALLING DOOR CLOSERS

HARDWARE SET: 04

DOOR NUMBER:

102A 102B 105A 105B

EACH TO HAVE:










3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	CLASSROOM DEADBOLT	B663T		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	PUSH PLATE	8200 4" X 16"		630	IVE
1	EA	PULL PLATE	8302 6" 4" X 16"		630	IVE
1	EA	SURFACE CLOSER	4111 EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

HARDWARE SET: 05

DOOR NUMBER:

103A 107A 113A

EACH TO HAVE:












3	EA	HINGE	5BB1HW 5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	ND96TD RHO		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	4111 RW/62A		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	SET	SEALS	8303AA X D.S.		AA	ZER
1	EA	DOOR SWEEP	39A X D.W.		A	ZER
1	EA	THRESHOLD	8655A X D.W.		A	ZER

HARDWARE SET: 06

DOOR NUMBER:

104A 114A

EACH TO HAVE:

3	EA	HINGE	5BB1HW 5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	99-NL		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	4111 RW/62A		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142A X D.W. +4"		AA	ZER
1	SET	SEALS	8303AA X D.S.		AA	ZER
1	EA	DOOR SWEEP	39A X D.W.		A	ZER
1	EA	THRESHOLD	8655A X D.W.		A	ZER

HARDWARE SET: 07

DOOR NUMBER:

106A 106D 106E 106F 106H 106I
 106L 106M 106O 106R 106S 106U
 106V 106W 106Z

EACH TO HAVE:












ALL HARDWARE BY DOOR
MANUFACTURER

HARDWARE SET: 08

DOOR NUMBER:

106B 106C 106G 106J 106K 106N
 106P 106Q 106T 106X 106Y

EACH TO HAVE:












3	EA	HINGE	5BB1HW 5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	99-L-06		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	4111 RW/62A		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142A X D.W. +4"		AA	ZER
1	SET	SEALS	8303AA X D.S.		AA	ZER
1	EA	DOOR SWEEP	39A X D.W.		A	ZER
1	EA	THRESHOLD	8655A X D.W.		A	ZER

HARDWARE SET: 09

DOOR NUMBER:

108A 115A

EACH TO HAVE:












3	EA	HINGE	5BB1HW 5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	ND96TD RHO		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	LOCK GUARD	LG13		630	IVE
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	4111 RW/62A		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142A X D.W. +4"		AA	ZER
1	SET	SEALS	8303AA X D.S.		AA	ZER
1	EA	DOOR SWEEP	39A X D.W.		A	ZER
1	EA	THRESHOLD	8655A X D.W.		A	ZER

HARDWARE SET: 10

DOOR NUMBER:

117A

EACH TO HAVE:










3	EA	HINGE	5BB1HW 5 X 4.5 NRP		630	IVE
1	EA	ENTRANCE LOCK	ND92TD RHO		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	LOCK GUARD	LG13		630	IVE
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	4111 RW/62A		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142A X D.W. +4"		AA	ZER
1	SET	SEALS	8303AA X D.S.		AA	ZER
1	EA	DOOR SWEEP	39A X D.W.		A	ZER
1	EA	THRESHOLD	8655A X D.W.		A	ZER

HARDWARE SET: 11

DOOR NUMBER:

117B

EACH TO HAVE:






3	EA	HINGE	5BB1HW 5 X 4.5 NRP		630	IVE
1	EA	ENTRANCE LOCK	ND92TD RHO		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	4111 RW/62A		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	SET	SEALS	8303AA X D.S.		AA	ZER
1	EA	DOOR SWEEP	39A X D.W.		A	ZER
1	EA	THRESHOLD	8655A X D.W.		A	ZER

HARDWARE SET: 12

DOOR NUMBER:

118A

EACH TO HAVE:






3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	ND96TD RHO		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

HARDWARE SET: 13

DOOR NUMBER:

119A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	PRIVACY LOCK	ND40S RHO		626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	SET	SEALS	188S X D.S.		BLK	ZER

END OF SECTION 08 7100

SECTION 08 8000 - GLAZING**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. Glass for windows, doors, interior borrowed lites, and storefront framing.
- 2. Glazing sealants and accessories.

B. Related Requirements:

- 1. Section 08 1113 "Hollow Metal Doors and Frames" for vision panels in interior doors and interior borrowed lites.
- 2. Section 08 4113 "Aluminum-Framed Entrances and Storefronts."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Manufacturers/Fabricators of Glass Products: Firms that utilize primary glass in the production of glass products that may include coated glass, laminated glass, and insulating glass.
- C. Sealed Insulating Glass Unit Surfaces:
 - 1. Surface 1: Exterior surface of outer lite.
 - 2. Surface 2: Interspace-facing surface of outer lite.
 - 3. Surface 3: Interspace-facing surface of inner lite.
 - 4. Surface 4: Interior surface of inner lite.
- D. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.
- E. IBC: International Building Code.
- F. Interspace: Space between lites of an insulating-glass unit.

G. Sealed Insulating Glass Unit Surfaces:

1. Surface 1: Exterior surface of outer lite.
2. Surface 2: Interspace-facing surface of outer lite.
3. Surface 3: Interspace-facing surface of inner lite.
4. Surface 4: Interior surface of inner lite.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product indicated as follows, other than clear monolithic vision glass; 12 inches square.
1. Coated glass.
 2. Insulating glass.
 3. Bird-safe glass.
- C. Glazing Accessory Samples: For gaskets, sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturers of insulating-glass units with sputter-coated, low-E coatings glass, testing agency and sealant testing agency.
- A. Product Certificates: For glass and glazing products, from manufacturer.

- B. Product Test Reports: For tinted glass, coated glass, insulating glass, bird-safe glass and glazing sealants, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
- E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Section 08 4113 "Aluminum-Framed Entrances and Storefronts" to match glazing systems required for Project, including glazing methods.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.11 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, signed by coated-glass product primary manufacturer or manufacturer/fabricator, as applicable, agreeing to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer's standard form, signed by insulating-glass product manufacturer/fabricator, agreeing to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years from date of Substantial Completion.
- D. Installer's Warranty: Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or deterioration of glass or glazing products due to faulty installation.
1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design Product:** Glass product selections are based on the primary glass manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
1. **Vitro Architectural Glass** (formerly PPG Glass): Cheswick PA, (855) 887-6457, <http://www.vitroglazings.com>.
 2. Or Approved Equal.
- B. Source Limitations for Glass: Obtain from single primary glass manufacturer and a single manufacturer/fabricator each glass type.
1. For glass sputter-coated (vacuum deposition process) with solar-control low-e coatings, obtain glass products in fabricated units from a manufacturer/fabricator certified by the primary glass manufacturer.
 2. Obtain tinted glass from single source from single manufacturer.
 3. Obtain reflective-coated glass from single source from single manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E1300.
1. Design Wind Pressures:
 - a. As indicated on Drawings.
 2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

- C. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with basic-protection testing requirements in ASTM E 1996 for Wind Zone indicated in drawings when tested according to ASTM E 1886.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 - 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 - 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
 - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass (Kind HS), or fully tempered float glass (Kind FT) as needed to comply

with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass (Kind HS) or fully tempered float glass (Kind FT) as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass (Kind FT).

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
- B. Annealed Ultra-Clear (Low Iron) Float Glass: Class I (clear).
 - 1. **Basis-of-Design Product:** Glass product selections are based on the primary glass manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Vitro Architectural Glass** (formerly PPG Glass); **Starfire:** Cheswick PA, (855) 887-6457, <http://www.vitroglazings.com>.
 - b. Or Approved Equal.
- C. Tinted Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Class 2 (tinted), Quality-Q3.
 - A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I (transparent flat glass), Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 - A. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I (transparent flat glass), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 - B. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process following primary glass product manufacture.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.
 - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 - 2. Perimeter Spacer: Manufacturer's standard spacer material and construction.

3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 1. Neoprene complying with ASTM C 864.
 2. EPDM complying with ASTM C 864.
 3. Silicone complying with ASTM C 1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- A. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- B. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.7 GLAZING SEALANTS

- A. General:
 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. **Products:** Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
 - a. Dow Corning Corporation; *Dow Corning® 790 Silicone Building Sealant*.
 - b. Pecora Corporation; *890NST*.
 - c. Sika Corporation; *SikaSil WS-290*.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
 1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.9 MONOLITHIC GLASS SCHEDULE

- A. Glass Type B [**G-1**]: Clear annealed float glass.
 - 1. Minimum Thickness: 6 mm.
- B. Glass Type B [**G-2**]: Clear fully tempered float glass.

1. Minimum Thickness: 6 mm.
2. Safety glazing required.

3.10 INSULATING GLASS SCHEDULE

A. Glass Type A [**IG-1**]: Low-E-coated, clear insulating glass with highly visible acid-etched pattern for bird-safe glazing.

1. **Basis-of-Design Product:** Glass product selections are based on the primary glass manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Vitro Architectural Glass** (formerly PPG Glass); **Solarban® 70 Glass (formerly Solarban® 70XL)**: Cheswick PA, (855) 887-6457, <http://www.vitroglazings.com>.
 - b. Or Approved Equal.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Annealed ultra-clear (low iron) float glass, with highly visible acid-etched pattern for bird-safe glazing.
 - a. Adhere to the American Bird Conservancy 2"x4" rule
 - b. Threat factor: 25 or less.
5. Interspace Content: Air.
6. Indoor Lite: Clear annealed or Annealed ultra-clear (low iron) float glass.
7. Low-E Coating: Sputtered on surface 2.
8. Pattern for bird-safe glazing: Acid-etched on surface 1.
9. Winter Nighttime U-Factor: 0.28 maximum.
10. Summer Daytime U-Factor: 0.26 maximum.
11. Visible Light Transmittance: 64 percent minimum.
12. Solar Heat Gain Coefficient: 0.27 maximum.

B. Glass Type A [**IG-2**]: Low-E-coated, clear insulating glass, fully tempered with highly visible acid-etched pattern for bird-safe glazing.

1. **Basis-of-Design Product:** Glass product selections are based on the primary glass manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Vitro Architectural Glass** (formerly PPG Glass); **Solarban® 70 Glass (formerly Solarban® 70XL)**: Cheswick PA, (855) 887-6457, <http://www.vitroglazings.com>.
 - b. Or Approved Equal.
2. Overall Unit Thickness: 1 inch.

3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Fully tempered or ultra-clear (low iron) fully tempered float glass, with highly visible acid-etched pattern for bird-safe glazing.
 - a. Adhere to the American Bird Conservancy 2"x4" rule
 - b. Threat factor: 25 or less.
5. Interspace Content: Air.
6. Indoor Lite: Fully tempered or ultra-clear (low iron) fully tempered float glass.
7. Low-E Coating: Sputtered on second surface.
8. Pattern for bird-safe glazing: Acid-etched on surface 1.
9. Winter Nighttime U-Factor: 0.28 maximum.
10. Summer Daytime U-Factor: 0.26 maximum.
11. Visible Light Transmittance: 64 percent minimum.
12. Solar Heat Gain Coefficient: 0.27 maximum.
13. Safety glazing required.

END OF SECTION 08 8000

SECTION 08 9119 - FIXED LOUVERS**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. Fixed extruded-aluminum louvers with drainable blades.

B. Related Requirements:

- 1. Section 07 9200 "Joint Sealants" for sealants applied during louver installation.
- 2. Section 13 3419 "Metal Building Systems" for pre-engineered building assemblies.
- 3. Division 23 for power actuated dampers connected to drainable blade louvers.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).
- C. Vertical Louver: Louver with vertical blades (i.e., the axis of the blades are vertical).
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven-rain performance, as determined by testing according to AMCA 500-L.
- F. Windborne-Debris-Impact-Resistant Louver: Louver that provides specified windborne-debris-impact resistance, as determined by testing according to AMCA 540.

1.4 REFERENCES

- A. AAMA 611 – Voluntary Specification for Anodized Architectural Aluminum.

- B. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.
- C. AMCA 511 - Certified Ratings Program for Air Control Devices.
- D. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 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.
 - 1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- C. Product Schedule: For louvers. Use same designations indicated on Drawings.
- D. Samples: For each type of metal finish required.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- C. Windborne-debris-impact-resistance test reports.
- D. Field quality-control reports.
- E. Sample Warranties: For manufacturer's special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall be International Organization for Standardization (ISO) 9001 accredited.

B. Installer Qualifications: A qualified installer specializing in performing work of this section who has specialized in the application/installation of work similar to that required for this project.

C. Product Qualifications:

1. Louver licensed to bear AMCA Certified Ratings Seal. Ratings based on tests and procedures performed in accordance with AMCA 511 and comply with AMCA Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance and water penetration ratings.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.

C. Handling: Protect materials and finishes during handling and installation to prevent damage.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

B. 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.

1.10 WARRANTY

A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.

- B. Special Warranty for Louver System: Submit warranty on Manufacturer's standard form in which Manufacturer agrees to promptly repair or replace louver systems, free of charge, that fail in materials within specified warranty period.
 - 1. Warranty Period: Not less than five (5) years from date of Substantial Completion.
- C. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Manufacturer warrants the Finish under normal atmospheric conditions:
 - a. Will not crack, craze, flake or blister
 - b. Will not change or fade more than (5) Delta-E Hunter units as determined by ASTM method D-2244
 - c. Will not chalk in excess of ASTM D-4214-07 number (8) rating, determined by the procedure outlined in ASTM D-4214-07 specification test.
 - 2. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Seismic Performance: As indicated on drawings.
- C. 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.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

- E. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Continuous-Line, Drainable-Blade Louver: Stationary drainable louver type with drain gutters in each blade and head with downspouts in jambs and mullions with all welded construction and hidden vertical supports to allow continuous line appearance.
 - 1. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Ruskin Company;** *ELF375DX* 3900 Dr. Greaves Road, Kansas City, Missouri, 64030, (816) 761-7476, <https://www.ruskin.com>
 - b. Or Approved Equal.
- B. Substitutions: See Section 01 6000 Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.
 - 2. Louver Depth: 4 inches, not including louver screens, blank-off panels and/or other accessories.
 - 3. Frame and Blade Nominal Thickness: Not less than 0.081 inch.
 - 4. Mullion Type: Hidden/semirecessed.
 - 5. Louver Performance Ratings:
 - a. Free Area: Not less than 22.01 sq. ft. for 120-inch-wide by 48-inch-high louver.
 - b. Water Penetration: Maximum of 0.01 ounces per square foot (3.1 g/m²) of free area at an air flow of 873 feet per minute (4.4 m/s) free area velocity when tested for 15 minutes.
 - c. Air Flow: 7490 cubic fpm.
 - d. Air Performance: Not more than 0.15-inch wg static pressure drop at 873-fpm through free-area.
 - 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached.
 - 2. Finish: Where exposed to view from the exterior, same finish as louver frames to which louver screens are attached. Where non-visible to view from the exterior, mill finish unless otherwise indicated.
 - 3. Type: Removeable and rewirable frames with a driven spline or insert.
- D. Louver Screening for Aluminum Louvers:
 - 1. Bird Screening: Flattened, expanded aluminum, 5/8 inches by 0.040 inch thick.

2.5 MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.6 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
 - 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern.
- C. Maintain equal louver blade spacing to produce uniform appearance.
- D. 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.
- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer.

1. Semirecessed Mullions: Where indicated, provide mullions partly recessed behind louver blades, so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.

G. Provide subsills made of same material as louvers or extended sills for recessed louvers.

H. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-C21A31, Class 2, 0.4 mils (0.01mm) or thicker; apply finish following chemical etching and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean opening 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 setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Install louvers at locations indicated on the drawings and in accordance with manufacturer's instructions.
- B. Locate and place louvers level, plumb, in plane of wall, at indicated alignment with adjacent work.

- C. The supporting structure shall be designed to accommodate the point loads transferred by the louvers when subject to the design wind loads.
- D. 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.
- E. Form closely fitted joints with exposed connections accurately located and secured.
- F. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- G. 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.
- H. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07 9200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering in accordance with manufacturer's instructions, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces in accordance with manufacturer's instructions with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. 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 08 9119

SECTION 09 2216 - NON-STRUCTURAL METAL FRAMING**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. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Sound-attenuation blankets.

B. Related Requirements:

1. Section 05 4000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For embossed, high-strength steel studs and tracks, firestop tracks, post-installed anchors, and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association (CSSA), the Steel Framing Industry Association (SFIA), or the Steel Stud Manufacturers Association (SSMA).

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Notify manufacturer of damaged materials received prior to installation.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice".

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
 - 1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."
- B. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft..
- C. Design framing systems in accordance with American Iron and Steel Institute Publication "S220 - North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members", except as otherwise shown or specified.
- D. Design loads: As indicated on the Architectural Drawings or 5 PSF minimum as required by the International Building Code.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 645 and ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
 - 2. Protective Coating: Comply with ASTM C 645; ASTM A 653/A 653M G40 (Z120), Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120) or DiamondPlus® coating; roll-formed from steel meeting mechanical and chemical requirements of ASTM A 1003 with a zinc-based coating. Galvannealed products are not acceptable.
 - a. Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authorities having jurisdiction.

- B. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems or comparable product from one of the members of the Steel Framing Industry Association (SFIA) by one of the following:
1. Or Approved Equal.
- C. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 01 6000 "Product Requirements," and the following:
1. Products are approved by manufacturer in writing for application specified.
 2. Products meet performance and physical characteristics of basis-of-design product.
- D. Source Limitations: Obtain framing members and components from single source from single manufacturer.
- E. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
1. Non-Structural Steel Studs: Cold-formed galvanized steel C-studs as per ASTM C 645 for conditions indicated below:
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; ProSTUD line of products or a comparable product.
 - 1) Minimum Base-Metal Thickness: As indicated on Drawings and as required by horizontal deflection performance requirements.
 - 2) Flange Size: 1-1/4 inches.
 - 3) Web Depth: As indicated on Drawings.
 2. Non-Structural Track: Cold-formed galvanized steel runner tracks, drywall track, in conformance with ASTM C 645 for conditions indicated below:
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; ProTRAK line of products or a comparable product.
 - 1) Minimum Base-Metal Thickness: Track thickness to match wall stud thickness or as per design.
 - 2) Flange Size: 1-1/4 inches.
 - 3) Web Depth: Track web to match stud web size.
 3. Embossed Non-Structural Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.
 - a. "EQ" (Equivalent Gauge Thickness) Steel Studs and Tracks (Runners): Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012) need not meet the minimum thickness

limitation or minimum section properties set forth in ASTM C 645. The submission of an evaluation report is acceptable to show conformance to this requirement.

4. Steel Framing Stud and Track Wall System (OPTIONAL): Self-locking metal studs, and telescoping stud extensions and tracks.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; TRAKLOC Steel Framing System TRAKLOC Fixed Length Stud (TLF), TRAKLOC Adjustable Stud (TLA), TRAKLOC Elevator Stud (TLE), TRAKLOC Track (TTS), or a comparable product.
 - 1) Minimum Base-Metal Thickness: As indicated on Drawings and as required by horizontal deflection performance requirements.
 - 2) Web Depth: As indicated on Drawings.
 5. Steel Framing Stud and Deflection Track Wall System (OPTIONAL): Self-locking metal studs with telescoping stud extension with knockout in each flange to allow for 1 inch of deflection for fire-rated head-of-wall deflection system.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; TRAKLOC Deflection Stud (TLD) and TRAKLOC Track (TTS) or a comparable product.
 - 1) Minimum Base-Metal Thickness: As indicated on Drawings and as required by horizontal deflection performance requirements.
 - 2) Web Depth: As indicated on Drawings.
- F. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch minimum vertical movement.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Fast Top Clip FTC3, FTC5 or a comparable product.
 2. Single Long-Leg Track System: ASTM C645 top track with 2-inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; BlazeFrame DL Deflection Track or a comparable product.

- b. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Spazzer 9200 Bridging and Spacer Bar, or a comparable product.
- c. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Cold-Formed Channel and EasyClip U-Series Angle U543, U545, U547, or a comparable product.
- 3. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
- 4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; BlazeFrame DSL, MaxTrak Slotted Deflection Track or a comparable product.
- G. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; BlazeFrame DSL, MaxTrak or a comparable product.
- H. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Backing Plate or a comparable product.
 - 2. Minimum Base-Steel Thickness: As indicated on Drawings.
- I. Channel Bridging and Bracing: Pre-notched steel, 7/8 inch by 7/8 inch by 50 inches, 0.0329-inch minimum base-steel thickness (OPTIONAL).
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Spazzer 9200 Bridging and Spacing Bar.
- J. U-Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Cold-Formed U-Channel and EasyClip U-Series Angle U543, U545, U547, or a comparable product.
 - 2. Depth: 1-1/2 inches.
 - 3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.0538-inch-thick, galvanized steel.
- K. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Furring Channel or a comparable product.
 2. Minimum Base-Steel Thickness: As indicated on Drawings.
 3. Depth: As indicated on Drawings.
- L. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges.
1. Depth: As indicated on Drawings.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.
- M. Carrying Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges.
1. Depth: 3/4 inch.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0296 inch.
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch diameter wire.
- B. Hanger Attachments to Concrete:
1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, AC193, AC58, or AC308 as appropriate for the substrate.
 - a. Uses: Securing hangers to structure.
 - b. Type: Torque-controlled, expansion anchor, torque-controlled, adhesive anchor, or adhesive anchor.
 - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
 - d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.
 2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, in size indicated on Drawings.

- E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch wide flanges.
1. Depth: As indicated on Drawings.
- F. Furring Channels (Furring Members):
1. Cold-Formed Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges, 3/4 inch deep.
 2. Non-Structural Steel Studs: Cold-formed galvanized steel C-studs as per ASTM C 645 for conditions indicated below:
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; ProSTUD line of products or a comparable product.
 - 1) Minimum Base-Metal Thickness: As indicated on Drawings and as required by horizontal deflection performance requirements.
 - 2) Flange Size: 1-1/4 inches.
 - 3) Web Depth: As indicated on Drawings.
 3. Non-Structural Track: Cold-formed galvanized steel runner tracks, drywall track, in conformance with ASTM C 645 for conditions indicated below:
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; ProTRAK line of products or a comparable product.
 - 1) Minimum Base-Metal Thickness: Track thickness to match wall stud thickness or as per design.
 - 2) Flange Size: 1-1/4 inches.
 - 3) Web Depth: Track web to match stud web size.
 1. Embossed Non-Structural Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally equivalent to conventional ASTM C 645 steel studs and tracks.
 - a. "EQ" (Equivalent Gauge Thickness) Steel Studs and Tracks (Runners): Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645. The submission of an evaluation report is acceptable to show conformance to this requirement.
 2. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.
 - a. Minimum Base-Steel Thickness: As indicated on Drawings.

3. Resilient Furring Channels: 1/2-inch deep members designed to reduce sound transmission.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; RC Deluxe (RCSD) Resilient Channel, or a comparable product.
 - b. Configuration: Asymmetrical.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc.
 - b. Chicago Metallic Corporation.
 - c. USG Corporation.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.
- C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Thermal Insulation: As specified in Section 07 2111 "Pre-Engineered Building Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
 - 1. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
 - 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
 - 3. Tile Backing Panels: 12 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

- C. Install studs so flanges within framing system point in same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts that penetrate partitions above ceiling to provide support for gypsum board or other ceiling materials as indicated on Drawings.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure as indicated.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 - a. Install sound attenuation blankets before installing finished wall panel surface materials unless blankets are readily installed after panels have been installed on one side.
- E. Direct Furring:
 - 1. Attach to concrete or masonry with screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Hangers: 48 inches o.c.

2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 24 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to steel roofing panels.
 7. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 8. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 9. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Installation Tolerances: Install suspension systems that are level to within **1/8 inch in 12 feet** measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 2216

SECTION 09 6200 – SPECIALTY FLOORING**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. Poured-in-place impermeable monolithic recycled rubber granule flooring system.
- B. Related Sections:
 - 1. Section 03 3000 "Cast-in-Place Concrete" for interior concrete floor slabs.
 - 2. Section 32 1216 "Asphalt Paving" for construction of asphalt paving.
 - 3. Section 32 1313 "Concrete Paving" for exterior concrete pavement.

1.3 DEFINITIONS

- A. Unitary Surfacing: A protective surfacing of one or more material components bound together to form a continuous surface; same as "unitary system" in ASTM F2223.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include manufacturer's technical data, application instructions, and recommendations for each flooring component required.
- B. Shop Drawings: For each specialty flooring system, include materials, plans, cross sections, drainage, installation and edge termination.
 - 1. Patterns and colors.
- C. Samples for Initial Selection: For each type of specialty flooring system required.

- D. Samples for Verification: For each type of specialty flooring system indicated, 12 inches square, applied to a rigid backing by Installer for this Project.

1.6 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- B. Material Certificates: For each type of specialty flooring system, from manufacturer.
- C. Material Test Reports: For each specialty flooring system, by a qualified testing agency.
- D. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the products involved.
- E. Field quality-control reports.
- F. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For surface flooring system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer who has specialized in installation of work similar to that required for this project.
- B. Engage an installer who is certified in writing by specialty flooring system manufacturer as qualified to apply specialty flooring systems indicated.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Storage: Store only acceptable project materials on site, in suitable location convenient to progress of work. Comply with all health and fire regulations. Product should be stored in a dry area protected from the weather on a smooth, flat, dry surface with temperatures maintained between 60° F and 80° F, or such ambient temperature conditions as may be specifically recommended by manufacturer.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Comply with specialty flooring system manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting specialty flooring system application.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions and ambient temperature, humidity, ventilation and substrate temperatures and moisture levels permit specialty flooring system installation to be performed according to manufacturers' written instructions and warranty requirements.
- C. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during specialty flooring system application.
- D. Close spaces to traffic during surface flooring system application and for 48 hours after application unless manufacturer recommends a longer period.

1.11 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of flooring system that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Wear-through of the surface layer under normal and proper usage for the specified period for the specified product and its intended use.
 - 2. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Source Limitations: Obtain specialty flooring system materials, including primers, resins, adhesives and topcoats, from single source from single manufacturer, or as recommended in writing by manufacturer of specialty flooring system. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

2.2 PERFORMANCE REQUIREMENTS

- A. Impact Attenuation: According to ASTM F 1292.
- B. Accessibility of Surface Systems: According to ASTM F 1951.

2.3 UNITARY SEAMLESS SURFACING

- A. Specialty Flooring System: Poured-in-place impermeable monolithic recycled rubber granule floor surfacing designed to produce a seamless floor.
 - 1. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Polylast Systems, LLC; Veterinary Clinic Flooring:** 7432 E. Tierra Buena Ln #105, Scottsdale, AZ 85260, (480) 998-3033, <https://polylastsystems.com/>
 - b. **Werm Flooring Systems; WERM Flooring:** 702 Overhead Drive, Oklahoma City, OK 73128, 800-350-7564, <https://www.wermflooring.com/>
 - c. Or Approved Equal.
 - 2. Substitutions: See Section 01 6000 Product Requirements.
 - a. For any product not identified as "Basis of Design", submit information as specified for substitutions.
- B. System Characteristics:
 - 1. Material: 100% recycled crumb rubber with manufacturer's standard primers and binders.
 - 2. Color and Pattern: Solid Black.
 - 3. Wearing Surface: Rough textured for slip resistance.
 - 4. Overall System Thickness: 3/4 inch.
 - 5. Weight: Approximately 3.3 lbs. psf.
- C. System Physical Properties: Provide surface flooring system with the following minimum physical property requirements when tested according to test methods indicated:
 - 1. Shore A Hardness: 5 tests ranging from 51.0 to 59.0 with an average of 55.6 (+/-3.0), according to ASTM D2240.
 - 2. Resistance to Chemicals: 60 Minutes and 24 hours: Passed with no change in surface dulling, attack, or color (White Vinegar, Rubbing Alcohol (70%), White Mineral Oil, Sodium Hydroxide (5%), Hydrochloric Acid (5%), Sulfuric Acid (5%), Household Ammonia (5%), Household Bleach (5%), Disinfectant - phenol type (5%), Unleaded Gasoline) according to ASTM F925.
 - 3. Abrasion Resistance: Passed with less than 1.00 gram maximum weight loss according to ASTM D3389.
 - 4. Static Coefficient of Friction (SCOF): 12 tests with an average of 0.75, Designation Slip-Resistant according to ASTM D2047.

5. Static Load Test: 3 tests, 250 psi, 0.000-inch indentation after 24 hour recovery according to ASTM F 970.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for maximum moisture content, subgrade and substrate conditions, drainage, installation tolerances and other conditions affecting performance of the Work.
 1. Asphalt Substrates: Verify that substrates are dry, sufficiently cured to bond with adhesive, free from surface defects, and free of dust dirt loose, particles, grease, oil and other contaminants incompatible with equine surface system or that may interfere with adhesive bond.
 2. Concrete Substrates: Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with specialty flooring system or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by specialty flooring system manufacturer.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare and clean substrates to receive surfacing products according to specialty flooring system manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for surface flooring system application. Verify that substrates are sound and without high spots, ridges, holes and depressions.
- B. Concrete and Asphalt Substrates: Provide sound surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with specialty flooring system.
 1. Repair unsatisfactory surfaces and fill holes and depressions.
 - a. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to specialty flooring system manufacturer's written instructions.
 - b. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from telegraphing through specialty flooring system according to manufacturer's written instructions.
 2. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

- C. Surface Flooring System Materials: Mix components and prepare materials according to surface flooring system manufacturer's written instructions.

3.3 INSTALLATION, GENERAL

- A. General: Comply with specialty flooring system manufacturer's written installation instructions. Install specialty flooring system over area and in thickness indicated in the drawings.
- B. All surfaces will be inspected prior to installation and must be clean, smooth, dry, flat, and structurally sound. The installation surface must be free of moisture, sealers, paint, adhesives, solvents, mold, mildew, and any other coatings or films.

3.4 INSTALLATION, OF SEAMLESS SPECIALTY FLOORING SYSTEM

- A. Seamless Surface: Mix and apply components of surface flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface and impact-attenuating system of total thickness indicated.
 - 1. Substrate Primer: Apply over prepared substrate at manufacturer's standard spreading rate for type of substrate.
 - 2. Poured Crumb Rubber: Spread over primed base course to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation, with a minimum of cold joints as indicated in shop drawings and approved by Architect.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.6 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

3.7 PROTECTION

- A. Protect surface flooring system from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by specialty flooring system manufacturer.

END OF SECTION 09 6200

SECTION 09 9113 - EXTERIOR PAINTING**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 surface preparation and the application of paint systems on the following exterior substrates:

1. Steel.
2. Galvanized metal.
3. Aluminum (not anodized or otherwise coated).
4. Wood.
5. Plastic and plastic trim fabrications.

- B. Related Requirements:

1. Section 05 1200 "Structural Steel Framing" for shop priming structural steel.
2. Section 05 5000 "Metal Fabrications" for shop priming metal fabrications.
3. Section 05 5213 "Pipe and Tube Railings" for shop priming pipe and tube railings.
4. Section 07 1900 "Water Repellents" for water repellents applied to unit masonry assemblies.
5. Section 09 9123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
6. Section 09 9600 "High-Performance Coatings" for tile-like coatings.
7. Section 13 3419 "Metal Building Systems" for shop priming of primary and secondary structural steel framing members.
8. Section 32 1723 "Pavement Markings" for pavement markings applied to asphalt and concrete pavement.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

- B. Samples for Initial Selection: For each type of topcoat product.

- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat. Provide a minimum of three (3) samples; one will be retained by the Architect while the remaining samples will be returned for the Contractor's distribution and use.
1. Submit Samples on rigid backing, 8 inches square.
 2. Apply coats on Samples in steps to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.
 2. Indicate VOC content.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 1 gallon of each material and color applied.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer specializing in performing work of this section who has specialized in the application/installation of work similar to that required for this project.
1. Engaged in application of similar paint systems for a minimum of five (5) years.
 2. Employ skilled employees who are experienced and knowledgeable in painting systems application, and familiar with the requirements of the specified work.
 3. Show successful completion of at least five (5) projects of similar size and complexity to the specified project.

- B. Mockups: Apply mockups (benchmark samples) of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups (benchmark samples).
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:
1. Product name and type (description).
 2. Batch date.
 3. Color number.
 4. VOC content.
 5. Environmental handling requirements.
 6. Surface preparation requirements.
 7. Application instructions.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Product selections are based on the manufacturer indicated. Subject to compliance with requirements, provide products from Sherwin-Williams Company (The) or a comparable product from one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Dunn-Edwards Corporation.
 - 3. PPG Paints.
 - 4. Tnemec Company, Inc.
 - 5. Or Approved Equal.
- B. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 01 6000 "Product Requirements," and the following:
 - 1. Products are approved by manufacturer in writing for application specified.
 - 2. Products meet performance and physical characteristics of basis-of-design product including published ratio of solids by volume, plus or minus two percent.
- C. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
 - 1. Manufacturer's designations that may be listed in the Drawings or on a separate color schedule, if applicable, are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

- B. **VOC Content:** For field applications, provide paints and coatings that complies with VOC content limits of authorities having jurisdiction.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner *may* engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner *may* direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
 - 1. Report, in writing, conditions that may affect application, appearance, or performance of paint.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMUs): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
 - a. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "Data Pages" "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2. Sand surfaces that will be exposed to view, and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Plastic and Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of non-factory-finished exterior doors and entire exposed surface of exterior door frames.
 4. Paint entire exposed surface of non-factory-finished window frames and sashes.
 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.

- h. Mechanical equipment mounting brackets and shelves.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Ferrous Metal, Galvanized-Metal, and Aluminum Substrates:
 - 1. Waterbased Light Industrial Acrylic System: over shop coat primer. Intended for use at exterior hollow metal doors and frames.
 - a. Prime Coat: Primer, rust-inhibitive, water-based.
 - 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Water-based Acrylic, exterior, matching topcoat.
 - c. Topcoat: Water-based Acrylic, semi-gloss, exterior:
 - 1) S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.

2. Waterbased/Alkyd Urethane System: over shop coat primer. Intended for use at exterior structural steel columns and beams, canopies, metal fences and gates, pipe bollards and other miscellaneous metal exposed to view.
 - a. Prime Coat: Primer, rust-inhibitive, water-based.
 - 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Water-based acrylic-alkyd, exterior, matching topcoat.
 - c. Topcoat: Water-based alkyd-urethane, semi-gloss, exterior:
 - 1) S-W Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150 Series, at 4.0 mils wet, 1.4 mils dry, per coat.
- B. Wood Substrates, Transparent Surfaces.
 1. Modified Oil Transparent Clear System: Intended for use at exterior wood benches.
 - a. Surface Prep: Penetrating oil.
 - 1) S-W SuperDeck Revive, 0.01612068; thoroughly rinse.
 - b. First Coat: Transparent clear finish, matching topcoat.
 - c. Topcoat: Transparent clear finish, satin:
 - 1) S-W WoodScapes® Premium Translucent Finish, Satin, A15C00204.
- C. Plastic Substrates:
 1. Waterbased Acrylic System: Intended for use at exterior PVC piping exposed to UV.
 - a. Prime Coat: Primer, rust-inhibitive, water-based.
 - 1) S-W Extreme Bond Primer, B51W150 Series, at 3.1 mils wet, 0.9 mils dry.
 - b. Intermediate Coat: Water-based Acrylic, exterior, matching topcoat.
 - c. Topcoat: Water-based Acrylic, semi-gloss, exterior:
 - 1) S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.

END OF SECTION 09 9113

SECTION 09 9123 - INTERIOR PAINTING**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 surface preparation and the application of paint systems on the following interior substrates:
 - 1. Steel.
 - 2. Galvanized metal.
 - 3. Aluminum (not anodized or otherwise coated).
 - 4. Shop primed metal.
 - 5. Wood.
 - 6. Plastic.
 - 7. Cotton, Canvas and All-Service-Jacket (ASJ) insulation covering.
- B. Related Requirements:
 - 1. Section 05 1200 "Structural Steel Framing" for shop priming metal substrates with primers specified in this section.
 - 2. Section 05 5000 "Metal Fabrications" for shop priming metal fabrications.
 - 3. Section 05 5213 "Pipe and Tube Railings" for shop priming pipe and tube railings.
 - 4. Section 08 1113 "Hollow Metal Doors and Frames" for shop priming hollow metal doors and frames.
 - 5. Section 09 9113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
 - 6. Section 09 9600 "High-Performance Coatings" for tile-like coatings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.

- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat. Provide a minimum of three (3) samples; one will be retained by the Architect while the remaining samples will be returned for the Contractor's distribution and use.
1. Submit Samples on rigid backing, 8 inches square.
 2. Apply coats on Samples in steps to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.
 2. Indicate VOC content.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 1 gallon of each material and color applied.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer specializing in performing work of this section who has specialized in the application/installation of work similar to that required for this project.
1. Engaged in application of similar paint systems for a minimum of five (5) years.
 2. Employ skilled employees who are experienced and knowledgeable in painting systems application, and familiar with the requirements of the specified work.
 3. Show successful completion of at least five (5) projects of similar size and complexity to the specified project.

- B. Mockups: Apply mockups (benchmark samples) of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups (benchmark samples).
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:
1. Product name and type (description).
 2. Batch date.
 3. Color number.
 4. VOC content.
 5. Environmental handling requirements.
 6. Surface preparation requirements.
 7. Application instructions.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Lead Paint: It is not expected that lead paint will be encountered in the Work.
 - 1. If suspected lead paint is encountered, do not disturb; immediately notify Architect and Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Product selections are based on the manufacturer indicated. Subject to compliance with requirements, provide products from Sherwin-Williams Company (The) or a comparable product from one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Dunn-Edwards Corporation.
 - 3. PPG Paints.
 - 4. Tnemec Company, Inc.
 - 5. Or Approved Equal.
- A. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 01 6000 "Product Requirements," and the following:
 - 1. Products are approved by manufacturer in writing for application specified.
 - 2. Products meet performance and physical characteristics of basis-of-design product including published ratio of solids by volume, plus or minus two percent.
- B. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
 - 1. Manufacturer's designations that may be listed in the Drawings or on a separate color schedule, if applicable, are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall provide materials that comply with VOC limits of authorities having jurisdiction

and for interior paints and coatings applied at Project site, the following VOC limits exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 150 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.

C. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner *may* engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner *may* direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Wood: 15 percent.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "Data Pages" "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - 1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - a. Do not paint stainless steel access panels.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed:
 - a. Uninsulated metal piping including but not limited to fire suppression and gas piping.
 - b. Pipe hangers and supports.
 - c. Tanks that do not have factory-applied final finishes.
 - d. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - e. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
 - f. Electrical equipment that is indicated to have a factory-primed finish for field painting.
 2. Paint the following work where exposed in occupied spaces:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - e. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner *may* engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. General: Paint designations (***PF,PS,PG,PE***) indicated on the Drawings, including but not limited to the Finish Schedule and Finish Legend, may be referenced in more than one system below. Use system appropriate to substrate indicated and intended use as included in the description for each system.
- A. Concrete Substrates, Pedestrian Traffic Surfaces:
 - 1. Epoxy System: Clear or Pigmented, intended for use at mechanical and electrical spaces and as indicated in the finish schedule, designation ***CE***.
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Topcoat: Epoxy, Gloss.
 - 1) S-W Armorseal 8100 Water Based Epoxy Floor Coating, B70 Series, at 2.0 to 4.0 mils dry, per coat.
- B. Metal Substrates (Aluminum, Steel, Galvanized Steel):
 - 1. Water-based Acrylic System: Intended for use at interior hollow metal doors and frames, and miscellaneous metal exposed to view.
 - a. Prime Coat: Primer, water based, rust-inhibitive for metal.
 - 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Water-based Acrylic, interior, matching topcoat.
 - c. Topcoat: Water-based Acrylic, interior, (Semigloss).
 - 1) S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.
 - 1. Water-Based Dry-Fall System: Intended for use at exposed ceilings, including exposed steel columns, beams, roof deck, cotton or canvas and ASJ Insulation-Covering, and as indicated in the finish schedule, designation ***PF***.
 - a. Topcoat: Dry fall, latex, Flat.

- 1) S-W Pro Industrial Waterborne Acrylic Dryfall Flat, B42-181 Series, at 6.0 mils wet, 1.5 mils dry.
- C. Wood Substrates: Stain and Waterbased Urethane finish intended for exposed wood items not indicated to receive shop-applied finish. Do not paint plywood backer boards for electrical equipment.
1. Transparent System: Low VOC Finish
 - a. Stain Coat: interior: S-W Minwax Performance Series Tintable Wood Stain 250 VOC.
 - b. Intermediate Coat: WB Polyurethane, matching topcoat.
Topcoat: Clear, interior, satin, Gloss Level 3:
 - 1) S-W Minwax Waterbased Oil-Modified Polyurethane, Satin.

END OF SECTION 09 9123

SECTION 09 9600 - HIGH-PERFORMANCE COATINGS**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 surface preparation and the application of high-performance coating systems on the following substrates:
 - 1. Exterior Substrates:
 - a. Steel railings at Wash Bays.
 - 2. Interior Substrates:
 - a. Steel railings at Wash Bays.
- B. Related Requirements:
 - 1. Section 05 5213 "Pipe and Tube Railings" for shop priming pipe and tube railings to receive coatings specified in this Section.
 - 2. Section 05 5000 "Metal Fabrications" for shop priming of steel fabrications to receive coatings specified in this Section.
 - 3. Section 09 9113 "Exterior Painting" for general field painting.
 - 4. Section 09 9123 "Interior Painting" for general field painting.
 - 5. Section 32 1723 "Pavement Markings" for pavement markings applied to asphalt and concrete pavement.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.
 - 2. VOC content.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Coatings: 1 gal. of each material and color applied.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer specializing in performing work of this section who has specialized in the application/installation of work similar to that required for this project.

1. Engaged in application of similar paint systems for a minimum of five (5) years.
 2. Employ skilled employees who are experienced and knowledgeable in painting systems application, and familiar with the requirements of the specified work.
 3. Show successful completion of at least five (5) projects of similar size and complexity to the specified project.
- B. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 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.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture's label with the following information:
1. Product name and type (description).
 2. Batch date.
 3. Color number.
 4. VOC content.
 5. Environmental handling requirements.
 6. Surface preparation requirements.
 7. Application instructions.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.10 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design:** Product selections are based on the manufacturer indicated. Subject to compliance with requirements, provide products from Sherwin-Williams Company (The) or a comparable product from one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Dunn-Edwards Corporation.
 - 3. PPG Paints.
 - 4. Tnemec Company, Inc.
 - 5. Or Approved Equal.
- B. **Comparable Products:** Comparable products of approved manufacturers will be considered in accordance with Section 01 6000 "Product Requirements," and the following:
 - 1. Products are approved by manufacturer in writing for application specified.
 - 2. Products meet performance and physical characteristics of basis-of-design product including published ratio of solids by volume, plus or minus two percent.
- C. **Source Limitations:** Obtain paint materials from single source from single listed manufacturer.
 - 1. Manufacturer's designations that may be listed in the Drawings or on a separate color schedule, if applicable, are for color reference only and do not indicate prior approval.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. **Material Compatibility:**
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in coating system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.
- A. **VOC Content:** For field applications, provide paints and coatings that complies with VOC content limits of authorities having jurisdiction.
- B. **Colors:** As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
 - 1. Report, in writing, conditions that may affect application, appearance, or performance of paint.
- B. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "Data Pages" "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and loose, damaged or abraded shop primer if any. Clean using methods recommended in writing by paint manufacturer.
 - 1. SSPC-SP 6/NACE No. 3.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop primer is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

- 1. Pigmented Polyurethane System: Intended for use at exterior and interior railings.
 - a. Prime Coat: Alkyd rust-inhibitive, quick dry:
 - 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two-component, pigmented, gloss:
 - 1) S-W Pro Industrial Waterbased Acrolon 100 Polyurethane, B65-720 Series, at 2.0 to 4.0 mils dry, per coat.

END OF SECTION 09 9600

SECTION 10 1416 - PLAQUES**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 metal plaques.
- B. Related Requirements:
 - 1. Section 10 1423 "Panel Signage" for plaques or signs similar to metal plaques, with or without frames, except that they are made of materials other than solid metal.
 - 2. Section 22 0500 "Common Work Requirements for Plumbing" and/or 22 0553 "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 3. Section 23 0500 "Common Work Results for HVAC" and/or 23 0553 "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
 - 4. Section 26 0553 "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plaques.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show plaque 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 plaque at least half size.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For plaques to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. The Manufacturer shall have no less than ten years experience in manufacture of similar products in successful use in similar applications to type specified.
- B. Installer Qualifications: An authorized representative of signage manufacturer or entity that employs installers who are trained and approved by manufacturer for installation and maintenance of plaques required for this Project.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - 2. Warranty Period: Manufacturer's standard Lifetime Warranty.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1; in the event of conflicting requirements, comply with the most restrictive requirements.

2.2 PLAQUES

- A. Etched Plaque: Chemically etched metal sheet or plate with texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. [Century Sign Builders](#); 2117 Commercial NE, Albuquerque, NM 87102, (505) 888-2901, estimating@csbsigns.com, www.csbsigns.com
 - b. [A.R.K. Ramos](#); 1321 South Walker Ave.: Oklahoma City, OK 73109, | (405) 235-5505 | customerservice@arkramos.com | www.arkramos.com
 - c. [Gemini Incorporated](#); 103 Mensing Way: Cannon Falls, MN 55009, (800) 538-8377, sales@geminisignproducts.com, www.geminisignproducts.com
2. Plaque Material: Sheet or plate stainless steel.
 3. Plaque Thickness: 0.0625 inch.
 4. Size: 24-inches by 18-inches.
 5. Fill Color: Black
 6. Finishes:
 - a. Integral Stainless-Steel Finish: No. 4.
 - b. Overcoat: Manufacturer's standard UV resistant, clear acrylic polyurethane coating.
 7. Integral Edge Style: Square cut, polished.
 8. Mounting: Concealed studs.
 9. Text and Typeface: Typeface as selected by Architect from manufacturer's full range.

2.3 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. Furnish stainless-steel devices unless otherwise indicated.
 3. Plaque Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque unless otherwise indicated.

2.5 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
 1. Comply with AWS for recommended practices in welding and brazing. 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.

2. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 3. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to work. Drill and tap for concealed fasteners.
- B. Chemically Etched Graphics: Chemically etch characters and other graphic devices into indicated plaque surface to produce precisely formed copy, incised to uniform depth.
1. Etched Metal: Fill etched graphics with manufacturer's standard UV resistant, acrylic polyurethane.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 2. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that plaque-support surfaces are within tolerances to accommodate plaques without gaps or irregularities between backs of plaques and support surfaces unless otherwise indicated.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
 - 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
- B. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as plaques are installed.
- C. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 1416

SECTION 10 1423 - PANEL SIGNAGE**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 signs that are directly attached to the building.
 - 1. Panel signs.
- B. Related Requirements:
 - 1. Section 01 5000 "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
 - 2. Section 10 1416 "Plaques" for one-piece, solid metal signs.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel 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, including raised characters and Braille, and layout for each sign at least half size.

- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
 - 2. Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
 - a. Aluminum.
 - b. Acrylic Sheet.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Panel Signs: Full-size Sample for each type of sign.
 - 2. Field-Applied, Vinyl-Character Signage and Graphics: Full size sample of characters on glass.
 - 3. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
 - 4. Exposed Accessories: Full-size Sample of each accessory type.
 - 5. Full-size Samples, if approved, will be returned to Contractor for use in Project.
- E. Product Schedule: For signage including room-identification signs. Use same designations indicated on Drawings or specified.
 - 1. Provide one sign for each interior door opening to include room name and number.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Manufacturer and Installer.
- B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Variable Component Materials:
 - a. Provide digital templates for end-user updatable inserts.
 - b. Provide source for consumables for end-user updateable inserts.

2. Tools: Two set(s) of specialty tools for assembling signs and replacing variable sign components.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 1. Engaged in the manufacture and fabrication of products of similar type and scope as those specified in this section for a minimum of five (5) years.
- B. Installer Qualifications: An authorized representative of signage manufacturer that is experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
 1. Engaged in the installation of similar systems for a minimum of five (5) years.
 2. Show successful completion of at least three (5) projects of similar size and complexity to the specified project.

1.10 FIELD CONDITIONS

- A. Field Measurements: Verify recess openings by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 2. Warranty Period: Manufacturer's standard Lifetime Warranty.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" the ABA standards of the Federal agency having jurisdiction

and ICC A117.1; in the event of conflicting requirements, comply with the most restrictive requirements.

2.2 PANEL SIGNS

- A. Source Limitations: Obtain interior panel signs from single source from single manufacturer.
- B. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 1. **Basis-of-Design Product:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Century Sign Builders; Alloy Sign System:** 2117 Commercial NE, Albuquerque, NM 87102, (505) 888-2901, <http://www.csbsigns.com/>
 - b. Or Approved Equal.
 2. Base Material/Chassis: Aluminum sheet or plate.
 - a. Shape: Rectangular or square aluminum panel with hole at each corner to receive exposed mechanical lens fasteners.
 - b. Sign-Panel Perimeter: Finish edges smooth.
 - 1) Edge Condition at Vertical and Horizontal Edges: Square Cut.
 - 2) Corner Condition in Elevation: Square.
 - c. Thickness: Manufacturer's standard for size of sign.
 - d. Finish: As selected by Architect from manufacturer's full range.
 3. Lens/Cover Material: Constructed of 0.125-inch or 0.0625-inch thick, clear single-ply, non-glare acrylic.
 4. Changeable Message Insert: Fabricated from commonly available transparency media no less than 5-mil thick, compatible with inkjet or laser printers such as 3M CG3710 or equivalent.
 5. Printed Graphic Inserts: Fabricated using a satin-coated, tear-resistant, rigid PVC media with eco-solvent, waterfast and UV stable inks.
 - a. Printed background inserts must be manufactured in color managed workflow with the following capacities:
 - 1) All printing must be done using a profiled printer with transmissible ICC profile.
 - 2) All approved colors used in final design must have LAB values recorded and submitted to Architect and Owner for future reference and duplication.

- 3) Printing must be performed on calibrated printer such that future orders of insert can be reproduced within 5 Delta E of recorded LAB values.
6. Tactile Raised Lettering/Graphic Method: Tactile lettering and symbols shall be formed using rotary engraving method and bonded to sign plaque using 3M Scotch 467HP adhesive. Text, numbers, and symbols must have 1/32-inch return cut to 22-degree angle. Text, numbers, and symbols must be constructed with materials having embedded coloration that is the final approved color for the signs. Products with painted or otherwise applied coloration method are not acceptable.
7. Braille Method: Braille must be constructed using the Edgerton Grade 2 Braille System using clear Raster beads.
8. Installation Method:
 - a. Wall Mounted Signs: Signs shall be mounted using silicone adhesive, unless otherwise indicated.
 - 1) Two-Face Tape will not be allowed due to vandalism concerns.
 - 2) Mechanical anchors will not be allowed unless Installer receives written approval of Architect prior to installation.
 - b. Flag Mount Hardware: Provide manufacturer's custom mounting bracket for flag mounted signs, as submitted and approved by Architect during the submittal process.
 - c. Wall Mount Hardware: Provide manufacturer's custom mounting hardware for wall mounted signs, as submitted and approved by Architect during the submittal process.
 - d. Suspended Mount Hardware: Provide manufacturer's custom mounting hardware for ceiling suspended mounted signs, as submitted and approved by Architect during the submittal process.
9. Color Selections: As selected by Architect from manufacturer's full range.
10. Text and Typeface: As selected by Architect from manufacturer's full range.
11. Size and Location:
 - a. Room Identification Signage:
 - 1) Size: 4-inch by 6-inch.
 - 2) Location: Provide one sign at each interior door.
 - b. Restroom/Toilet Room Signage:
 - 1) Size: 8-inch by 8-inch.
 - 2) Character: Minimum 3/4-inch high characters.
 - 3) Location: Provide one sign at each restroom/toilet interior door.

2.3 SIGN MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- D. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. Exposed Metal-Fastener Components, General:
 - a. Fastener Heads: Use screws and bolts with tamper-resistant Allen-head slots to secure lens/cover material over changeable message inserts, unless otherwise indicated.
- B. Adhesive: Silicone adhesive as recommended by sign manufacturer.
- C. High Bond, Ultra Clear, Double Coated Tape: High-bond, ultra-clear (optically clear) tape, with adhesive on both sides as recommended by sign manufacturer.

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes and details of construction.
 - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints, if any, to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 4. Form panels to required size and shape. Comply with requirements indicated for design, dimension, finish, color, and details of construction.

5. Coordinate dimensions and attachment methods required for substrate conditions.
- B. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that items, including anchorage devices, as approved by Architect during submittal process, embedded in permanent construction, are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions except where more stringent requirements apply.

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. Install signs so they do not protrude or obstruct according to the accessibility standard.
 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessibility: Install signs in locations on walls and other surfaces as indicated on Drawings and according to the accessibility standard.
- C. Mounting Methods:
1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
 2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- D. Panel Signs Mounted on Glass: To conceal back of panel sign, provide opaque vinyl film, 2-mil thickness, matching sign base material/chassis color, and finish onto same side of glass (surface 1) prior to installing panel sign with silicone adhesive.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 1423

SECTION 10 2113 – STAINLESS-STEEL TOILET COMPARTMENTS**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. Stainless steel toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

- 1. Section 06 1053 "Miscellaneous Rough Carpentry" for blocking.
- 2. Section 10 2800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

- 1. Include plans, elevations, sections, details, and attachment details.
- 2. Show locations of cutouts for compartment-mounted toilet accessories.
- 3. Show locations of reinforcements for compartment-mounted grab bars and locations of blocking for surface-mounted toilet accessories.
- 4. Show locations of centerlines of toilet fixtures.
- 5. Show locations of floor drains.
- 6. Show overhead support or bracing locations.

C. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

- 1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch square Samples of same thickness and material indicated for Work.
- 2. Each type of hardware and accessory.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.
- B. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals. Include the following:
 - 1. Maintenance instructions.
 - 2. Catalogue pages for each product.
 - 3. Name, address and phone number of the manufacturer.
 - 4. Copy of the final shop drawings.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original packaging, bearing brand name and marked to correspond with the approved shop drawings.
- B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, and other potential causes of damage.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.8 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
- B. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of stainless-steel toilet compartments 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. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 STAINLESS STEEL TOILET COMPARTMENTS

- A. **Basis-of-Design:** Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
1. **Hadrian Manufacturing Inc.; Standard Series, 5WL Embossed:** 965 Syscon Road, Burlington, Ontario L7L 5S3, (905) 333-0300, <http://www.hadrian-inc.com/>.
 2. Or Approved Equal.
- B. Substitutions: See Section 01 6000 Product Requirements.
1. For any product not identified as "Basis of Design", submit information as specified for substitutions.
- C. Toilet-Enclosure Style: Overhead/Headrail braced.
- D. Urinal-Screen Style: Wall hung flat panel.
- E. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.
 - a. Pilaster tops shall be reinforced with a 20-gauge channel to create extra strength and twist-free rigidity.
 2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units of size and material adequate for panel to withstand applied downward load on grab bar of at least 250 lbf, when tested according to ASTM F446, without deformation of panel.
 3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

- F. Urinal-Screen Construction:
 - 1. Flat-Panel Urinal Screen: Matching panel construction.
- G. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:
 - 1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.030 inch.
 - 2. Pilasters, Unbraced at One End: Manufacturer's standard thickness, but not less than 0.030 inch.
 - 3. Panels: Manufacturer's standard thickness, but not less than 0.030 inch.
 - 4. Doors: Manufacturer's standard thickness, but not less than 0.030 inch.
 - 5. Flat-Panel Urinal Screens: Thickness matching the panels.
- H. Pilaster Shoes and Sleeves (Caps): Stainless steel sheet, not less than 0.030-inch nominal thickness and 4 inches high, finished to match hardware.
 - 1. Pilaster shoes shall be a welded one-piece design. Two-piece shoes that can disassemble when kicked are unacceptable.
- I. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- J. Stainless Steel Finish: Manufacturer's standard textured finish (embossed/rigidized) on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - 1. Material: Stainless steel.
 - 2. Hinges: Manufacturer's minimum 0.062-inch thick brushed stainless-steel, full height continuous hinge with stainless-steel hinge pin, self-closing type.
 - 3. Latch and Keeper: Manufacturer's standard concealed or recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

- B. Overhead Bracing: Manufacturer's standard 1-inch by 1-5/8-inch continuous, extruded-aluminum head rail with double-ridge antigrip profile and in manufacturer's standard anodized finish, not less than 0.060-inch nominal thickness. Head rail shall be securely attached to wall and pilasters with manufacturer's fittings in such a way as to make a strong and rigid installation. All joints in headrails shall be made at pilaster.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel anchors compatible with related materials.

2.4 MATERIALS

- A. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- B. Stainless Steel Castings: ASTM A743/A743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch wide in-swinging doors for standard toilet compartments and 36-inch wide out-swinging doors with a minimum 32-inch wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

3.4 CLEANING AND PROTECTION

- A. Perform thorough cleaning according to manufacturer's written recommendations. Toilet partitions shall be left clean and free from disfigurement at time of Substantial Completion and Final Completion. Replace damaged and/or defective units.

END OF SECTION 10 2113

SECTION 10 2800 - TOILET, BATH, AND LAUNDRY ACCESSORIES**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. Public-use washroom accessories.
2. Private-use bathroom accessories.
3. Warm-air dryers.
4. Childcare accessories.
5. Underlavatory guards.
6. Custodial accessories.

- B. Related Requirements:

1. Section 10 2800 "Stainless-Steel Toilet Compartments."

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.
4. Manufacturer's warranty.

- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, visible silver spoilage defects.
 - 1. Warranty Period: 15 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for High-Speed Warm-Air Dryers: Manufacturer agrees to repair or replace high-speed warm-air dryers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five (5) years limited for labor and five (5) years for parts from date of Substantial Completion.
- D. Manufacturer's Special Warranty for Diaper-Changing Station: Manufacturer agrees to repair or replace diaper-changing station that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
 - 2. Warranty Period against Vandalism: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. 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 PUBLIC-USE WASHROOM ACCESSORIES

- A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

A. Liquid-Soap Dispenser - [01]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.

- a. **Bradley Corporation;** 6334 *Bradex*.
b. Or Approved Equal.

2. Description: Designed for dispensing soap in liquid form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 16 oz..
5. Materials: Stainless steel, No. 4 finish (satin).

B. Waste Receptacle - [02]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.

- a. **Bobrick Washroom Equipment, Inc.;** B-3644.
b. Or Approved Equal.

2. Description: Waste receptacle.
3. Mounting: Recessed.
4. Minimum Capacity: 12 gal.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Liner: Reusable molded plastic liner.

C. Mirror Unit - [04]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.

- a. Bobrick Washroom Equipment, Inc.; B-290 1836.
 - b. Or Approved Equal.
 2. Frame: Stainless-steel angle, 0.05 inch thick.
 - a. Corners: Welded and ground smooth.
 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 4. Size: 18-inches wide by 36-inches tall.
- D. Toilet Tissue (Jumbo-Roll) Dispenser - [05]:
1. Basis-of-Design Product: The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. Bobrick Washroom Equipment, Inc.; B-2892.
 - b. Or Approved Equal.
 2. Description: Two-roll unit with sliding panel to expose other roll.
 3. Mounting: Surface mounted.
 4. Capacity: 9- or 10-inch- diameter rolls.
 5. Material and Finish: Stainless steel, No. 4 finish (satin).
 6. Lockset: Tumbler type.
 7. Refill Indicator: Pierced slots at front.
- E. Grab Bar - [06]:
1. Basis-of-Design Product: The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. Bobrick Washroom Equipment, Inc.; B-6806x36.
 - b. Or Approved Equal.
 2. Mounting: Flanges with concealed fasteners.
 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
 4. Outside Diameter: 1-1/2 inches.
 5. Configuration and Length: Straight, 36 inches long.

F. Grab Bar - [07]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Bobrick Washroom Equipment, Inc.; B-6806x42.**
 - b. Or Approved Equal.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: Straight, 42 inches long.

G. Grab Bar - [08]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Bobrick Washroom Equipment, Inc.; B-6806x18.**
 - b. Or Approved Equal.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: Straight, 18 inches long.

H. Sanitary-Napkin Disposal Unit - [11]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Bobrick Washroom Equipment, Inc.; B-270.**
 - b. Or Approved Equal.
2. Mounting: Surface.
3. Door or Cover: Disposal-opening cover and face panel with continuous piano hinge.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Capacity: 1.0 gallons.

I. Liquid-Soap Dispenser - [12]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Bobrick Washroom Equipment, Inc.; B-2111.**
 - b. Or Approved Equal.
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 40 oz..
5. Materials: Stainless steel, No. 4 finish (satin).
6. Refill Indicator: Window type.

2.3 WARM-AIR DRYERS

A. Source Limitations: Obtain warm-air dryers from single source from single manufacturer.

A. High-Speed Warm-Air Dryer - [09]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Dyson Inc., 1330 W. Fulton St., Floor 5, Chicago, IL 60607; 888-397-6622, www.dyson.com/Airblade: Dyson Airblade V Electric hand dryer (Model HU02), Item No. 307174-01.**
 - b. Or Approved Equal.
2. Description: High-speed, warm-air hand dryer for rapid hand drying.
3. Mounting: Surface mounted, with low-profile design for ADA compliance.
4. Operation: Touch-free capacitive sensor activation.
 - a. Hand dry time: 12 seconds
 - b. Airspeed at nozzle: 420 mph
 - c. Operating Airflow: Up to 5.28 gal/sec.
 - d. Rated Operating Noise Power: 79 db(A)
5. Filtration: 99.97 percent at 0.3 microns particulate efficiency HEPA filter (Glass fiber and fleece prelayer).
6. Construction: Polycarbonate casing with anti-microbial additive in paint. Anti-microbially integrated external plastics and seals. Anti-tamper M4 exterior pin-hex screws. Water ingress protection to IP24.
7. Color Finish: Sprayed nickel finish.
8. Electrical Requirements: 110-127 V AC, 12 A, 1000 W.

2.4 CHILDCARE ACCESSORIES

A. Source Limitations: Obtain childcare accessories from single source from single manufacturer.

A. Diaper-Changing Station - [03]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Koala Kare Products; KB310-SSRE.**
 - b. Or Approved Equal.
2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
 - a. Engineered to support minimum of 300-lb static load when opened.
3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, No. 4 finish (satin), with high density polyethylene with Microban antimicrobial interior.
6. Liner Dispenser: Built in.

2.5 UNDERLAVATORY GUARDS

A. Underlavatory Guard (supply piping) - [13]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **Truebro by IPS Corporation; Lav Guard2, Model #99 E-Z.**
 - b. Or Approved Equal.
2. Description: Insulating pipe covering for one angle valve and supply piping assembly that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Quantity: Provide guard for both hot and cold supply valves and piping.
4. Material and Finish: Antimicrobial, soft, resilient molded vinyl, white.

B. Underlavatory Guard (p-trap) - [13]:

1. **Basis-of-Design Product:** The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.

- a. Truebro by IPS Corporation; *Lav Guard2, Model #100 E-Z*.
 - b. Or Approved Equal.
2. Description: Insulating pipe covering for p-trap drain piping assembly to prevent direct contact with and burns from piping; allow service access without removing coverings.
 3. Material and Finish: Antimicrobial, soft, resilient molded vinyl, white.

2.6 CUSTODIAL ACCESSORIES

- A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.
- B. Mop and Broom Holder - [10]:
 1. Basis-of-Design Product: The design is based on product indicated. Subject to compliance with requirements, provide named product or a comparable product meeting the quality, appearance, options and performance criteria with that specified.
 - a. Bobrick Washroom Equipment, Inc.; *B-239 x 34*.
 - b. Or Approved Equal.
 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
 3. Length: 34 inches.
 4. Hooks: Four.
 5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch-thick stainless steel.
 - b. Rod: Approximately 1/4-inch-diameter stainless steel.

2.7 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.
- C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

- G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.8 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 2800

SECTION 10 4416 - FIRE EXTINGUISHERS**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 portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Requirements:
 - 1. Section 10 4413 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
 - b. Faulty operation of valves or release levers.
 2. Warranty Period: Six years from date of shipment and/or delivery.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
1. Provide fire extinguishers approved, listed, and labeled by FM Global or ISO 9001 and ISO 14001 Certified UL Listed.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International.
 - c. Babcock-Davis.
 - d. Badger Fire Protection.
 - e. Buckeye Fire Equipment Company.
 - f. Fire End & Croker Corporation.
 - g. Guardian Fire Equipment, Inc.
 - h. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - i. Kilde Residential and Commercial Division.
 - j. Larsens Manufacturing Company.
 - k. MOON American.

- l. [Nystrom, Inc.](#)
 - m. [Oval Fire Products Corporation.](#)
 - n. [Potter Roemer LLC.](#)
 - o. [Pyro-Chem; Tyco Fire Suppression & Building Products.](#)
 - p. [Strike First Corporation of America \(The\).](#)
2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
 3. Valves: Manufacturer's standard.
 4. Handles and Levers: Manufacturer's standard.
 5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
1. Location: Use Multipurpose Dry-Chemical Type unless otherwise indicated.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: Top of fire extinguisher handle, for fire extinguishers weighing 40 lb or less, to be at 48 inches above finished floor.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 4416

SECTION 12 4813 - ENTRANCE FLOOR MATS AND FRAMES**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. Resilient entrance mats.
- 2. Recessed frames.

B. Related Requirements:

- 1. Section 03 3000 "Cast-in-Place Concrete" for concrete not designated as polished concrete.

1.3 COORDINATION

- A. Coordinate size and location of recesses in concrete to receive floor mats and frames.
- B. Coordinate integral installation of recessed frames and anchors with placing of concrete slab so frames are positioned accurately.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for floor mats and frames.

B. Shop Drawings:

- 1. Items penetrating floor mats and frames, if any, including door control devices.
- 2. Divisions between mat sections.
- 3. Perimeter floor moldings and/or frames.

C. Samples: For the following products, in manufacturer's standard sizes:

1. Floor Mat: Assembled sections of floor mat.
2. Tread Rail: Sample of each type and color.
3. Frame Members: Sample of each type and color.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Sample Warranties:
 1. Provide sample copy of Special Material Warranty (Entrance Floor Mats and Frames Manufacturer's Warranty) stating obligations, remedies, limitations, and exclusions of warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For floor mats and frames to include in maintenance manuals.
- B. Warranty: Submit warranty documents specified.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is ISO 9001 & 14001 certified.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.9 FIELD CONDITIONS

- A. Defer frame installations until building enclosure is completed and related interior finish work is in progress.
- B. Field measurements: Check actual openings for mats by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
- C. Recessed Conditions: Coordination with Section 03 3000 "Cast-in-Place Concrete" is required. For proper installation, the concrete recess must be flat, level 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.

1.10 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
- B. Special Warranty for Entrance Floor Mats and Frames: Submit warranty on Manufacturer's standard form in which Manufacturer agrees to promptly repair or replace components of Entrance Floor Mats and Frames, free of charge, that fail in materials within specified warranty period.
 - 1. Warranty Period: Not less than two (2) years from date of shipment.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

- A. Structural Performance: Provide roll-up rail mats and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:
 - 1. Standard rolling load performance is 350 lb./wheel with larger loading requirements as specified (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage).
- B. Flammability in accordance with ASTM E648, Class 1, Critical Radiant Flux, minimum 0.45 watts/m².
- C. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for accessible routes.
- D. Accessibility Standard: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

2.2 RESILIENT ENTRANCE MATS

- A. Source Limitations: Obtain entrance mats and frames from single source from single manufacturer.
- B. Basis-of-Design Product: Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a

comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.

1. **C/S Group: MI - Pedimat**; 6696 Route 405 Highway, Muncy, PA 17756, (800) 233-8493, <https://www.c-sgroup.com/>
2. Or Approved Equal.

C. Substitutions: See Section 01 6000 Product Requirements.

1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

D. Resilient Link Mats:

1. Exposed hinge rail connectors shall be extruded 6063-T6 aluminum, complete with perforations for drainage. Tread rails shall be manufactured from high-impact Regrind PET-G complete with co-extruded soft-durometer cushions.
2. Depth: 7/16 inch without frame.
3. Color: As selected by Architect from full range of manufacturer's standard selections.
4. Mat Size: As indicated on Drawings.
5. Tread Insert:
 - a. HD – MonoTuft HD™ Carpet shall meet CRI standard for good indoor air quality. Fibers shall include a minimum of 100, 12-mil monofilament fibers per square inch.
 - b. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths.
 - c. Anti-static carpet fibers shall contain antimicrobial additive and be treated with Scotchgard® to reduce soiling. Carpet weight shall be 33-oz./yd².
 - d. Color: As selected by Architect from manufacturer's full range.

2.3 FRAMES

A. Recessed Frames:

1. **Basis-of-Design Product**: Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - a. **C/S Group: LB, level base frame**; 6696 Route 405 Highway, Muncy, PA 17756, (800) 233-8493, <https://www.c-sgroup.com/>
 - b. Or Approved Equal.
2. Substitutions: See Section 01 6000 Product Requirements.
 - a. For any product not identified as "Basis of Design", submit information as specified for substitutions.

3. Extruded Aluminum: ASTM B 221, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 - a. Frame Dimensions: 3/4-inch depth with 1/4-inch wide exposed surface.
 - b. Color and Finish: As selected by Architect from full range of manufacturer's standard selections.
 - c. Installer shall use recommended latex screed to ensure level base.
4. Trim Fillers: EPDM trim fillers shall be furnished as required when standard 2-inch tread spacing cannot be maintained.
 - a. Color: As selected by Architect from manufacturer's full range.

2.4 CONCRETE FILL AND GROUT MATERIALS

- A. Provide concrete fill and grout equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.5 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
 1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- C. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

2.6 ALUMINUM FINISHES

- A. Mill finish.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Manufacturer shall offer assistance and guidance to provide a template of irregular shaped mat assemblies to ensure a proper installation.

3.3 INSTALLATION

- A. Install recessed mat frames and mats to comply with manufacturer's written instructions so that tops of mats will be flush with adjoining finished flooring. Set mats with tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.
 - 1. Install necessary shims, spacers, and anchorages for proper location, and secure attachment of frames.
 - 2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.
 - 3. Delay setting mats until construction traffic has ended.

3.4 PROTECTION

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 12 4813

SECTION 13 3419 - METAL BUILDING SYSTEMS**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. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Metal soffit panels.
5. Accessories.

B. Related Requirements:

1. Section 03 3000 "Cast-In-Place Concrete" for placement of anchor bolt, leveling plates and grout.
2. Section 07 2111 "Pre-Engineered Building Insulation" for roof and wall batt insulation system, vapor barrier liner fabric, thermal blocks, straps, and other devices and components.
3. Section 08 1113 "Hollow Metal Doors and Frames" for personnel doors and frames.
4. Section 08 3613 "Sectional Doors" for sectional vehicular doors in metal building systems.
5. Section 08 4113 "Aluminum-Framed Entrances and Storefronts."
6. Section 08 9800 "Louvers."
7. Section 09 9113 "Exterior Painting."

1.3 DEFINITIONS

- A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

1.4 REFERENCES

- A. American Institute of Steel Construction (AISC):

1. 360, Specification for Structural Steel Buildings.
 2. RCSC, Specification for Structural Joints Using High Strength Bolts.
 3. Design Guide 3, Serviceability Design Considerations for Steel Buildings.
- B. American Iron and Steel Institute (AISI):
1. AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
- C. American Welding Society (AWS):
1. AWS D1.1 / D1.1M – Structural Welding Code – Steel.
 2. AWS D1.3 / D1.3M – Structural Welding Code – Sheet Steel.
- D. Association for Iron & Steel Technology (AISE):
1. AISE 13 – Specifications for Design and Construction of Mill Buildings.
- E. ASTM International (ASTM):
1. A36 – Standard Specification for Carbon Structural Steel
 2. A123 – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 3. A354 – Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
 4. A475 – Specification for Zinc-Coated Steel Wire Strand
 5. A500 – Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 6. A529 – Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
 7. A536 – Standard Specification for Ductile Iron Castings.
 8. A563 – Specification for Carbon and Alloy Steel Nuts
 9. A572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 10. A653 / A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 11. A792 / A792M – Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 12. A992 – Standard Specification for Structural Steel Shapes.
 13. A1011 – 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.
 14. A1039 – Specification for Steel, Sheet, Hot Rolled, Carbon, Commercial, Structural, and High-Strength Low-Alloy, Produced by Twin-Roll Casting Process
 15. E96 / E96M – Standard Test Methods for Water Vapor Transmission of Materials.
 16. E108—Spread-of Flame Testing: Class 1A Rating.
 17. 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.

18. E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 19. E1592 – Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
 20. E1646 – Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
 21. E1680 – Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems
 22. E2140 – Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head
 23. F436 – Specification for Hardened Steel Washers
 24. F1145 – Specification for Turnbuckles, Swaged, Welded, Forged
 25. F1554 – Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
 26. F3125 – Standard Specification for High Strength Structural Bolts
- F. CSA – Canadian Standards Association:
1. S16, Design of Steel Structures
- G. CWB – Canadian Welding Bureau
- H. IAS – International Accreditation Service
- I. SJI – Steel Joist Institute
- J. Florida Product Approval:
1. Product approved under file numbers,
 - a. FL704
 - b. FL705
 - c. FL4813
 - d. FL4837
 - e. FL4838
 - f. FL38033
 - g. FL2686
 - h. FL4891
 - i. FL30072
- K. FM Global:
1. FMRC Standard 4471 – Approval Standard for Class 1 Roofs for Hail Damage Resistance, Combustibility, and Wind Uplift Resistance.
- L. Metal Building Manufacturers Association (MBMA):
1. MBMA Metal Building Systems Manual
- M. Underwriters Laboratories (UL):

1. UL 580 – Standard for Tests for Uplift Resistance of Roof Assemblies

1.5 COORDINATION

- A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 03 3000 "Cast-in-Place Concrete."
- B. Coordinate interface with concrete masonry unit (CMU) walls specified in Section 04 2000 "Unit Masonry Assemblies" and as shown on Drawings.
- C. Coordinate installation of multi-layer pre-manufactured building roof insulation systems where the upper most layer of insulation is placed over and perpendicular to the purlins as the roof sheeting is applied. Roof and wall batt insulation, vapor barrier liner fabric, thermal blocks, straps, and other devices and components are specified in 07 2111 "Pre-Engineered Building Insulation."
 1. It is important that the insulation cavity be filled or the cavities be ventilated to minimize the probability of condensation.
- D. Coordinate installation of roof penetrations including skylights specified in Section 08 6223 "Tubular Skylights" with openings through roof as shown on Drawings.
- E. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.
- F. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 1. Review methods and procedures related to metal building systems including, but not limited to, the following:
 - a. Condition of foundations and other preparatory work performed by other trades.
 - b. Structural load limitations.
 - c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
 - d. Required tests, inspections, and certifications.
 - e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.
 2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

- a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
 - b. Structural limitations of purlins and rafters during and after roofing.
 - c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
 - d. Temporary protection requirements for metal roof panel assembly during and after installation.
 - e. Roof observation and repair after metal roof panel installation.
3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
- a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
 - b. Structural limitations of girts and columns during and after wall panel installation.
 - c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
 - d. Temporary protection requirements for metal wall panel assembly during and after installation.
 - e. Wall observation and repair after metal wall panel installation.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Structural Framing System.
 - b. Metal roof panels.
 - c. Metal wall panels.
 - d. Metal soffit panels.
 - e. Flashing and trim.
 - f. Sidewall exhaust/ventilator fans.
 - g. Accessories.
- B. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
 2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

- a. Show provisions for attaching roof curbs, fire protection piping, large diameter high-volume low-speed fans, unit heaters, exhaust fans in gable ends, tubular skylights, cable trays and pipe racks.
 3. Metal Roof and Wall Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
 - a. Show roof-mounted items including equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
 - b. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
 4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Gutters.
 - c. Downspouts.
 - C. Samples for Initial Selection: For units with factory-applied finishes.
 - D. Samples for Verification: For the following products:
 1. Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
 2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
 3. Accessories: Nominal 12-inch-long Samples for each type of accessory.
 - E. Delegated-Design Submittal: For metal building systems.
 1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.
- 1.8 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For erector, manufacturer, professional engineer and land surveyor.
 - B. Manufacturer Accreditation: Statement that metal building system and components were designed and produced by a manufacturer accredited according to the International Accreditation Service's AC472.
 - C. Welding certificates.

- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
 - E. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
 - 1. Name and location of Project.
 - 2. Order number.
 - 3. Name of manufacturer.
 - 4. Name of Contractor.
 - 5. Building dimensions including width, length, height, and roof slope.
 - 6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 - 7. Governing building code and year of edition.
 - 8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, temperature loads during service and construction of the building, and auxiliary loads (cranes and rigging loads).
 - 9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 - 10. Building-Use Category: Indicate category of building use and its effect on load importance factors.
 - F. Erector Certificates: For qualified erector, for each product, from manufacturer.
 - G. Manufacturer Certificates: For each product, from manufacturer.
 - H. Material Test Reports: For each of the following products:
 - 1. Structural steel including chemical and physical properties.
 - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shop primers.
 - 5. Nonshrink grout.
 - I. Source quality-control reports.
 - J. Field quality-control reports.
 - K. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.
 - L. Sample Warranties: For special warranties.
- 1.9 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

1.10 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.
 - 1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
 - 2. Engineering Responsibility: Preparation of a 3-dimensional or justifiable 2-dimensional comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- E. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- F. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- G. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.
- H. Fire-Resistance Ratings: Where indicated, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
 - 2. Combustion Characteristics: ASTM E 136.
- I. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Build mockups for typical wall metal panel including accessories.
 - a. Size: 48 inches long by 48 inches.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

1.12 FIELD CONDITIONS

- A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements:
 1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
 2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.13 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
- B. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 35 years from date of Substantial Completion.
- C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion. [N](#)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer, or as recommended in writing by manufacturer of metal building system.
- B. Basis-of-Design: Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 1. Nucor Building Systems: 600 Apache Trail, Terrell, TX 75160, (866) 384-2965, <http://www.nucorbuildingsystems.com>
 2. Or Approved Equal.
- C. Substitutions: See Section 01 6000 Product Requirements.
 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.2 SYSTEM DESCRIPTION

- A. Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
 1. Provide metal building system of size and with bay spacings, roof slopes, and spans indicated.

- B. Primary-Frame Type:
 - 1. Rigid Modular: Solid-member, structural-framing system with interior columns.
 - 2. Lean-to: Solid- Built-Up, structural-framing system, designed to be partially supported by another structure.
- C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, and end-wall columns, as follows:
 - 1. Location: West Exterior Wall as indicated on Drawings.
- D. End-Wall Framing: Engineer end walls to be expandable. Provide primary frame, capable of supporting full-bay design loads, and end-wall columns, as follows:
 - 1. Location: East Exterior Wall as indicated on Drawings.
- E. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.
- F. Eave Height: As indicated on Drawings.
- G. Bay Spacing: As indicated on Drawings.
- H. Roof Slope: 2 inches per 12 inches.
- I. Roof System: Manufacturer's standard standing-seam, vertical-rib, metal roof panels with field installed insulation as specified in Section 07 2111 "Pre-Engineered Building Insulation."
- J. Exterior Wall System: Manufacturer's standard exposed-fastener, tapered-rib, metal wall panels with field installed insulation as specified in Section 07 2111 "Pre-Engineered Building Insulation."
 - 1. Liner Panels: Tapered rib.
 - 2. Coordinate interface with concrete masonry unit (CMU) walls specified in Section 04 2000 "Unit Masonry Assemblies" and as shown on Drawings.

2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal building system including comprehensive engineering analysis, using performance requirements and design criteria indicated. Engineer must be licensed in the State of New Mexico.
- B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."

1. Design Loads: As indicated on Drawings.
 2. Deflection Limits: Design metal building system assemblies to withstand design loads with deflections no greater than the following:
 - a. Purlins and Rafters: Vertical deflection of **1/240** of the span.
 - b. Girts: Horizontal deflection of **1/240** of the span.
 - c. Metal Roof Panels: Vertical deflection of **1/240** of the span.
 - d. Metal Wall Panels: Horizontal deflection of **1/240** of the span.
 - e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
 3. Drift Limits: Engineer building structure to withstand design loads with drift limits no greater than the following:
 - a. Lateral Drift: Maximum of **1/240** of the building height.
 - b. Seismic Drift: Refer to Structural Drawings.
 4. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.
- C. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- E. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
- F. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E1680 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- G. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- H. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft..

- I. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- J. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: UL 580 Class 90.
- K. Energy Star Listing: Roof panels that are listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- L. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 - 1. Three-year, aged, solar reflectance of not less than **0.36** and emissivity of not less than **0.80**.
 - 2. Three-year, aged, Solar Reflectance Index of not less than **40** when calculated according to ASTM E1980.

2.4 STRUCTURAL-STEEL FRAMING

- A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."
- B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
 - 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 - a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, subject to approval by Architect.
 - 2. Rigid Modular Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
 - 3. Frame Configuration: As shown on Drawings.
 - 4. Exterior Column: Straight or Supermarket profile with taper occurring above 8-foot height as shown on Drawings.

5. Rafter: Tapered.
- E. End-Wall Framing: Manufacturer's standard primary end-wall framing at locations not indicated to be expandable fabricated for field-bolted assembly to comply with the following:
1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
 2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
- F. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch wide flanges.
 - a. Depth: As needed to comply with system performance requirements.
 - b. Finish: Provide shop primed steel purlins at all locations.
 2. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch wide flanges.
 - a. Depth: As required to comply with system performance requirements.
 - b. Finish: Provide shop primed steel girts at all locations.
 3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
 - a. Finish: Provide shop primed steel eave struts at all locations.
 4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary-frame flanges.
 - a. Finish: Provide shop primed bracing at all locations.
 5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
 - a. Finish: Provide shop primed steel eave struts at all locations.
 6. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, fabricated from zinc-coated (galvanized) steel sheet.
 7. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet.
 8. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.

9. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- G. Bracing: Provide adjustable wind bracing using any of the methods indicated, at manufacturer's option, as follows:
1. Rods: ASTM A36/A36M; ASTM A572/A572M, Grade 50; or ASTM A529/A529M, Grade 50; minimum 1/2-inch- diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
 2. Cable: ASTM A475, minimum 1/4-inch- diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
 3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
 4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 6. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.
- H. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.
- I. Materials:
1. W-Shapes: ASTM A992/A992M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
 2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
 3. Plate and Bar: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
 4. Steel Pipe: ASTM A53/A53M, Type E or S, Grade B.
 5. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
 6. Structural-Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A1008/A1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
 7. Metallic-Coated Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
 8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.

- b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, SS, Grade 50 or 80; with Class AZ50 coating.
 9. Non-High-Strength Bolts, Nuts, and Washers: ASTM A307, Grade A, carbon-steel, hex-head bolts; ASTM A563 carbon-steel hex nuts; and ASTM F844 plain (flat) steel washers.
 - a. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.
 10. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - a. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.
 11. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
 12. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1 hardened carbon-steel washers.
 - a. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.
 - b. Retain appropriate materials in "Unheaded Anchor Rods" Subparagraph below or revise if other materials are required. AISC uses the generic term "anchor rods" to include unheaded rods and headed bolts. Plate washers are used with oversized baseplate holes to resist nut pull-through and to transfer shear from baseplate to anchor rod.
 13. Unheaded Anchor Rods: ASTM F1554, Grade 36.
 - a. Configuration: Straight.
 - b. Nuts: ASTM A563 heavy-hex carbon steel.
 - c. Plate Washers: ASTM A36/A36M carbon steel.
 - d. Washers: ASTM F436 hardened carbon steel.
 - e. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.
 14. Headed Anchor Rods: ASTM F1554, Grade 36.
 - a. Configuration: Straight.
 - b. Nuts: ASTM A563 heavy-hex carbon steel.
 - c. Plate Washers: ASTM A36/A36M carbon steel.
 - d. Washers: ASTM F436 hardened carbon steel.
 - e. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.
 15. Threaded Rods: ASTM A193/A193M.

- a. Nuts: ASTM A563 heavy-hex carbon steel.
 - b. Washers: ASTM F436 hardened carbon steel.
 - c. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.
- J. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Clean and prepare in accordance with SSPC-SP2.
 2. Coat with shop primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil.
 - a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side unless otherwise noted.
 - b. Shop Primers: Provide primers that comply with Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."
 - c. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1) Basis-of-Design Product: Product selections are based on the manufacturer/product indicated. Subject to compliance with requirements, provide basis-of-design manufacturer/product or a comparable manufacturer/product meeting the quality, appearance, options and performance criteria with that specified.
 - 2) Sherwin-Williams Company (The); Steel Spec Universal Primer, B50RV6227/B50AV8431.
 - 3) Or Approved Equal.

2.5 METAL ROOF PANELS

- A. Standing-Seam, Trapezoidal-Rib, Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.0222-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range to match white roof panel color of adjacent structures on the fairground property.
 2. Clips: Manufacturer's standard floating type to accommodate thermal movement; fabricated from zinc-coated (galvanized) steel, aluminum-zinc alloy-coated steel, or stainless-steel sheet.
 3. Joint Type: Mechanically seamed.
 4. Panel Coverage: 24 inches.

5. Panel Height: 3 inches.

B. Finishes:

1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish 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.
 2. Concealed Finish: Apply pretreatment and 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.

2.6 METAL WALL PANELS

- A. Exposed-Fastener, Tapered-Rib, Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.0185-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range to match wall panel color of adjacent structures on the fairground property.
2. Major-Rib Spacing: 12 inches o.c.
3. Panel Coverage: 36 inches.
4. Panel Height: 1.25 inches.

- B. Tapered-Rib, Metal Liner Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.0185-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: Siliconized polyester.
 - b. Color: As selected by Architect from manufacturer's full range.
2. Major-Rib Spacing: 12 inches o.c.
3. Panel Coverage: 36 inches.

4. Panel Height: 1.25 inches.

C. Finishes:

1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish 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.
2. Concealed Finish: Apply pretreatment and 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.

2.7 METAL SOFFIT PANELS

- A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Exposed-Fastener, Tapered-Rib-Profile, Metal Soffit Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.0185-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M. 0.018
 - a. Exterior Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.
 2. Major-Rib Spacing: 12 inches.
 3. Panel Coverage: 36 inches.
 4. Panel Height: 1.25 inches.

2.8 THERMAL INSULATION

- A. Thermal Insulation: As specified in Section 07 2111 "Pre-Engineered Building Insulation."

2.9 PERSONNEL DOORS AND FRAMES

- A. Swinging Personnel Doors and Frames: As specified in Section 08 1113 "Hollow Metal Doors and Frames."

2.10 WINDOWS

- A. Windows: As specified in Section 08 4226 "Aluminum-Framed Entrances and Storefronts."
- B. Glazing: Comply with requirements specified in Section 08 8000 "Glazing."

2.11 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
 - 1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
 - 2. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.
 - 3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from stainless-steel sheet or nylon-coated aluminum sheet.
 - 4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or

premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.022-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
 2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.034-inch nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
- E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.022-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters.
 2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
- F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.022-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot long sections, complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters.
- G. Louvers: As specified in Section 08 9116 "Operable Wall Louvers."
- H. Materials:
1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
 - a. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
 - b. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM sealing washers bearing on weather side of metal panels.
 - c. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 - d. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

2. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
4. Metal Panel Sealants:
 - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
 - b. Joint Sealant: ASTM C920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.12 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 1. Make shop connections by welding or by using high-strength bolts.
 2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
 3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
 5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.
- D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

1. Make shop connections by welding or by using non-high-strength bolts.
 2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.13 SOURCE QUALITY CONTROL

- A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.
1. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
1. Engage land surveyor to perform surveying.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written instructions and drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
 - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
 - a. Joint Type: Snug tightened or pretensioned as required by manufacturer.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
 - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 - 2. Locate and space wall girts to suit openings such as doors and windows.
 - 3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
 2. Locate interior end-bay bracing only where indicated.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.
- K. Finish: All areas of finish on framing members that was left blocked out, unfinished, or scratched shall be finished and touched up in the field with the appropriate primer/epoxy as directed by drawings and this specification.

3.4 METAL PANEL INSTALLATION, GENERAL

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.
- D. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
 - a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
 2. Install metal panels perpendicular to structural supports unless otherwise indicated.
 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Locate metal panel splices over structural supports with end laps in alignment.
 6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

- E. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
 - 1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- F. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
 - 1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.5 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
 - 1. Install ridge and hip caps as metal roof panel work proceeds.
 - 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
 - 1. Install clips to supports with self-drilling or self-tapping fasteners.
 - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 - 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 - 4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
 - 5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.

6. Provide metal closures at peaks, rake edges, rake walls and each side of ridge and hip caps.
- C. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with exposed fasteners at each lapped joint, at location and spacing recommended by manufacturer.
1. Provide metal-backed sealing washers under heads of exposed fasteners bearing on weather side of metal roof panels.
 2. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
 3. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps and on side laps of nesting-type metal panels, on side laps of ribbed or fluted metal panels, and elsewhere as needed to make metal panels weatherproof to driving rains.
 4. At metal panel splices, nest panels with minimum 6-inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
- D. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.
- E. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
 2. Shim or otherwise plumb substrates receiving metal wall panels.
 3. When two rows of metal panels are required, lap panels 4 inches minimum.
 4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
 5. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.
 6. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 7. Install screw fasteners in predrilled holes.
 8. Install flashing and trim as metal wall panel work proceeds.
 9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.

10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
 11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.
- C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet, noncumulative; level, plumb, and on location lines; and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 METAL SOFFIT PANEL INSTALLATION

- A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.
- B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.8 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be

used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

- C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
 - 1. Tie downspouts to underground drainage system indicated.

3.9 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.
- B. Product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.10 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Repair damaged epoxy and/or primer coatings on structural items with the appropriate repair paint according to ASTM A 780 and manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."
- D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
 - 1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.
 - 1. Immediately before final inspection, remove protective wrappings from doors and frames.

- F. Windows: Clean metal surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances. Clean factory-glazed glass immediately after installing windows.
- G. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
 - 1. Restore louvers damaged during installation and construction period 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.
 - a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 13 3419

SECTION 21 0500 - COMMON WORK REQUIREMENTS FOR FIRE SUPPRESSION**PART 1 GENERAL****1.01 SCOPE OF WORK**

- A. See General Conditions and Supplemental General Conditions.
- B. The requirements listed under General Conditions and Supplemental General Conditions and the General Requirements are applicable to this section and all subsequent sections of Division 21 and form a part of the contract.
- C. Division 22 for Plumbing Systems.
- D. Division 23 for Heating, Ventilating and Air Conditioning (HVAC) Systems.
- E. Division 26 for Electrical Systems.
- F. Division 28 for Fire Alarm Systems.
- G. Division 31, for Trenching, Backfilling and Compaction requirements.
- H. Division 33 for requirements of site utility systems, including sanitary sewer, storm sewer, domestic water distribution system, fire main water distribution system, and natural gas service.
- I. All electrical work, regardless of voltage which is provided under Division 21 shall comply with the requirements of the National Electric Code (NEC) and Division 26.

1.02 FIRE SUPPRESSION DIVISION INDEX

- A. Section 21 0500 Common Work Requirements for Fire Suppression
- B. Section 21 0501 Demolition for Fire Suppression
- C. Section 21 0502 Installation of Owner-Furnished Equipment for Fire Suppression
- D. Section 21 0503 Trenching and Backfilling for Fire Suppression
- E. Section 21 0504 Pipe and Pipe Fittings for Fire Suppression
- F. Section 21 0505 Piping Specialties for Fire Suppression
- G. Section 21 0523 Valves for Fire Suppression
- H. Section 21 1315 Fire Protection System, Automatic Dry Pipe Sprinkler

1.03 CODES AND PERMITS

- A. The fire suppression shall be performed in strict accordance with the applicable provisions of the International Building Code, 2021 Edition; the Uniform Plumbing Code, 2012 Edition; the Uniform Mechanical Code, 2021 Edition and the International Fire Code, 2012 Edition as

adopted and interpreted by the State of New Mexico, City of Clovis, and the National Fire Protection Association (NFPA Regulations), current adopted edition, regarding fire protection, heating and ventilating and air conditioning systems and electrical systems. All materials and labor necessary to comply with rules, regulations and ordinances shall be provided. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern. The Contractor shall hold and save the Architect free and harmless from liability of any nature or kind arising from his failure to comply with codes and ordinances.

- B. Permits necessary for performance of the work shall be secured and paid for by the Contractor. All utility connections, extensions, and tap fees shall be paid for by the Contractor, unless otherwise specified herein. See Division 33 for all requirements associated with utility permits and fees, connections and extensions.

- C. The following lists some applicable codes and standards that shall be followed.
Applicable county and state mechanical, electrical, gas, plumbing, health and sanitary codes, laws and ordinances

National Electrical Manufacturer's Association Standards

National Electrical Code

Underwriters Laboratories, Inc. Standards

American National Standards Institute

American Society for Testing Materials Standards

Standards and requirements of local utility companies

National Fire Protection Association Standards

American Society of Mechanical Engineers Boiler and Pressure Vessel Codes

Occupational Safety and Health Act

The American Society of Sanitary Engineering

1.04 RECORD DRAWINGS

- A. See Division 1, for requirements associated with Project Record Drawings.
- B. The Contractor shall be responsible to maintain a complete and accurate set of marked up prints showing information on the installed location and arrangement of all mechanical work, and in particular, where changes were made during construction. The Contractor shall be responsible for keeping record drawings accurate and up-to-date throughout the construction period.

Record drawings may be reviewed and checked by the Architect during the construction and in conjunction with review and approval of monthly pay requests. The Contractor shall include copies of all addenda, RFI's, bulletins, and change orders neatly taped or attached to record drawing set.

- C. After installation and acceptance of direct buried underground piping and service lines in trenches, the Contractor shall take 'as-built' measurements, including all depths, prior to commencement of backfilling operations. It will not be sufficient to check off line locations. Definite measurements shall be taken for each service line. The location of buried piping and trench service lines shall be shown on the drawings and dimensioned from fixed points.

1.05 QUALIFICATIONS

- A. All mechanics shall be skilled in their respective trade.
- B. All welders shall be certified in accordance with the ASME Boiler Test Code, Section IX, latest issue.

1.06 QUALIFICATION PROCEDURES

- A. The storage, handling, and transportation of all refrigerants, oils, lubricants, etc. shall be accomplished in strict compliance with all State, local, and Federal Regulations including all requirements set forth by the Environmental Protection Agency (EPA) for the safe handling of regulated refrigerants and materials. The Contractor shall utilize qualified and/or certified personnel and equipment as prescribed by these requirements.

1.07 HAZARDOUS CONDITIONS

- A. Protruding metal (bolts, steel angles, etc.) potentially hazardous to maintenance and operation personnel, shall be cut back and/or protected to reduce the risk of injury.

1.08 HAZARD SIGNS

- A. Equipment rooms, fan plenums, and similar areas containing moving or rotating parts, or other potentially hazardous environments shall include signs on all doors entering such spaces that shall read similar to the following: "Hazardous Area - Authorized Personnel Only."

- B. Confined Spaces: Areas designated by OSHA Standard 1910.146 as a confined space shall be marked with a sign that reads "Confined Space - Entry by authorized personnel only, by permit."
1. "Confined Space" means a space that:
 - a. Is large enough and so configured that an employee can bodily enter and perform assigned work; and
 - b. Has limited or restricted means for entry or exit (for example, tanks, vessels, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
 - c. Is not designed for continuous employee occupancy.
- C. The Contractor shall survey the final premises to determine where any such potentially hazardous areas exist. If the Contractor feels that hazards exist which cannot be suitably provided for through the above typical methods, he shall forward in writing his concerns, and request for a decision concerning the referenced hazard, prior to the final inspection of the facilities.

1.09 SUBMITTALS

- A. The Contractor shall submit submittal brochures of all equipment, fixtures and materials to be furnished under Division 21, including but not limited to the following:
1. Piping materials, valves, equipment and installation methods, vibration isolation devices, pipe penetration installation methods and products for fire rated assemblies, and all equipment listed on equipment schedules, and in related construction documents.
 2. Materials, certification, shop drawings, and other information as specified in the individual Division 21 Specification Sections within this Specification.
- B. Unauthorized Substitutions: If substitute materials, equipment or systems are installed without prior review or are installed in a manner which is not in conformance with the requirement of this Specification and for which the Contractor has not received a written review, removal of all the unauthorized materials and installation of those indicated or specified shall be provided at no change in contract amount.
- C. All equipment shall be installed in accordance with the manufacturer's recommendations. Provide all accessories and components for optimum operation as recommended by the manufacturer.

- D. Expense: All costs for the preparation, correction, delivery, and return of the submittals shall be borne by the Contractor.
- E. Submittals and one resubmittal will be reviewed by the Architect/Engineer. If the Contractor fails to provide the required data with his second submittal, he will be charged for the third and subsequent reviews.
- F. See Division 1 for additional submission requirements.
- G. The Contractor shall submit a maximum of seven (7) copies of submittal brochures for review. Brochures shall be submitted within thirty (30) days after contract award. One (1) copy of all submittals will be retained by the Engineer. One (1) copy of all submittal data will be retained by the Engineer and one (1) copy will be provided to the Owner's Representative. The remaining copies will be returned to the Architect. Additional sets of submittals, if required by the Contractor, shall be reproduced by the Contractor from the reviewed and marked sets returned to the Contractor.
- H. Complete data must be furnished showing performance, quality and dimensions. No equipment or materials shall be purchased prior to receiving written notification that submittals have been reviewed and marked either "NO EXCEPTIONS TAKEN" or "EXCEPTIONS AS NOTED." Submittals returned marked "EXCEPTIONS AS NOTED" do not require resubmittal provided that the Contractor agrees to comply with all exceptions noted in the submittal, and so states in a letter.
- I. Review of Submittals: Submittals will be reviewed with reasonable promptness, but only for conformance with the design concept of the Project and for conformance with the information indicated on the Drawings and stated in the Specifications. Review of a separate item as such will not indicate review of the assembly in which the item functions. Review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents, nor for errors or omissions in the submittals; or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, functioning and completion of the work. Review shall not relieve the Contractor of responsibility for the equipment fitting within the allotted space shown on the drawings with all clearances required for equipment operation, service and maintenance including minimum clearances required by applicable codes, manufacturer's installation instructions and as necessary for proper clearance in front of all electrical panels as defined by the National Electric Code (NEC). Any relocation of mechanical and/or electrical equipment, materials and

systems required to comply with minimum clearances shall be provided by the Contractor without additional cost under the Contract.

- J. Shop drawings will be returned unchecked unless the following information is included: cover sheet shall be provided for each submittal of equipment, products and material proposed for use on the project. A common cover sheet for similar equipment (example: all air handling units or all fire protection products) is acceptable. The cover sheet shall list equipment by symbol number; reference all pertinent data in the Specifications or on the drawings; provide size and characteristics of the equipment, name of the project and a space large enough to accept a review stamp. The data submitted shall reflect the actual equipment performance under the specified conditions and shall not be a copy of the scheduled data on the drawings. Cover sheet shall clearly identify any deviations from the specifications for submitted equipment, products, and materials.
- K. Use of substitutions reviewed and checked by the Engineer does not relieve the Contractor from compliance with the Contract Documents. Contractor shall bear all extra expense resulting from the use of any substitutions where substitutions affect adjoining or related work required in this Division or other Divisions of this Specification.
- L. If Contractor substitutes equipment for that drawn to scale on the drawings, he shall prepare a 1/4" = 1'-0" installation drawing for each equipment room where a substitution is made, using dimensions of substituted equipment, and including piping, and electrical equipment requirements, to verify that equipment will fit space with adequate clearances for maintenance. This 1/4" = 1'-0" fabrication drawing shall be submitted for review with the shop drawing submittals of the substitution. Failure to comply with this requirement will result in the shop drawings being returned unchecked.

1.10 USE OF CADD FILES

- A. Under certain conditions, the Contractor will be permitted the use of the Engineer's CADD files for documentation of as-builts, submittals, or coordination drawings.
- B. The Engineer may require compensation for the time necessary to format the CADD files delivery to the Contractor. Such work will include removal of title blocks, professional for seals, calculations, proprietary information, etc.

- C. The Contractor shall complete the enclosed License, Indemnity and Warranty Agreement, complete with contractor's name, address, and Contractor's Representative signature prior to request for CADD file usage.

1.11 PRIOR APPROVAL

- A. Prior approval (approval prior to bid) of alternate mechanical equipment suppliers and service providers is not required. Please do not request prior approval. Alternate manufacturers and service providers may be submitted after bid in accordance with the submittal process provided they meet or exceed the specifications and the indicated design intent.

1.12 GUARANTEE-WARRANTY

- A. See Division 1 for warranties.
- B. The following guarantee is a part of the specifications and shall be binding on the Contractor:

"The Contractor guarantees that this installation is free from mechanical defects. He agrees to replace or repair any part of the installation which may fail within a period of one year after date established below, provided that such failure is due to defects in the materials or workmanship or to failure to follow the specifications and drawings. Warranty of the Contractor-furnished equipment or systems shall begin on the date the system or equipment is placed in operation for beneficial use of the Owner or occupancy by the Owner, whichever occurs first; such date will be determined in writing, by means of issuing a 'Certificate of Substantial Completion', AIA Form G704," or equivalent.
- C. The extent of guarantees or warranties by Equipment and/or Materials Manufacturers shall not diminish the requirements of the Contractor's guarantee-warranty to the Owner.
- D. All items of fire suppression equipment shall be provided with a full one (1) parts and labor warranty, from the date of acceptance by the Owner.
- E. Fire pumps including controllers and transfer switches.

PART 2 PRODUCTS

2.01 QUALITY OF MATERIALS

- A. All equipment and materials shall be new, and shall be the standard product of manufacturers regularly engaged in the production of fire suppression equipment and shall be the manufacturer's latest design. Specific equipment, shown in schedules on drawings and

specified herein, is to set forth a standard of quality and operation.

- B. Hazardous or Environmentally Damaging Materials: Products shall not contain asbestos, mercury, PCBs, or other materials harmful to people or the environment.

2.02 ALTITUDE RATINGS

- A. Unless otherwise noted, all specified equipment capacities are for an altitude of 4600 feet above sea level and adjustments to manufacturer's ratings must be made accordingly.

2.03 ELECTRICAL WIRING AND CONTROL EQUIPMENT

- A. All wiring and conduit shall be furnished and installed as scheduled in Section 21 0549, Fire Suppression and Electrical Installation Coordination, unless otherwise noted or directed.
- B. The Contractor shall coordinate completely with all trades and Sub-Contractors as required to ensure that all necessary components of control work are included and fully understood. No additional cost shall accrue to the Owner as a result of lack of such coordination.
- C. The fire suppression piping system may be bonded to the electrical ground bus at the electrical service equipment, but shall not under any circumstances be used as the main grounding electrode for the electrical service.

2.04 PAINTING

- A. All finish painting of fire suppression systems and equipment will be under "Painting," unless equipment is hereinafter specified to be provided with factory applied finish coats.
- B. All equipment shall be provided with factory applied prime finish, unless otherwise specified.
- C. Touch-Up: If the factory finish on any equipment is damaged in shipment or during construction of the building, the equipment shall be refinished.

2.05 IDENTIFICATION OF VALVES

- A. Each valve shall be provided with a stamped metal tag secured to the valve. Tag shall indicate the valve number, the service and function of each valve. The Contractor shall furnish two sets of prints of drawings showing floor plan for each floor with all valves accurately located and labeled. Submitted drawings shall be neat and easily readable. In addition, the Contractor shall provide a valve chart, typed neatly on 8-1/2" x 11" sheets, listing the number, size, location, function, normal operating position, on each valve installed under Division 21. Tags shall be

stamped brass 1-1/2" diameter, and secured to valves by heavy copper figure eight hooks, braided stainless steel wire anchor, or other approved means.

- B. Division 21 valve tags shall be coordinated with Division 22 and Division 23 valve tags for coordinated format between each division.

2.06 PIPING SYSTEM IDENTIFICATION

- A. Means of Identification: All piping shall be identified by each of the means described below. The Contractor shall provide shop drawing submittal data for proposed labeling system materials and manufacturer's recommended installation procedures.
- B. Piping Systems shall be identified by means of an identifying legend on color coded background appropriately worded to indicate the "service" name of the pipe as shown on the drawings. Color coded banding shall also be provided. Additionally, an arrow shall be included to indicate the direction of flow through the pipe.
- C. Locations of Piping System Identification: The identifying legends and directional arrows described in the paragraphs preceding shall be located at the following points on each piping system:
 - 1. Adjacent to each valve in piping system.
 - 2. At every point of entry and exit where piping passes through a wall.
 - 3. On each pipe riser and junction.
 - 4. At a maximum interval of 20 feet on pipe lines exposed and concealed above accessible ceilings.
 - 5. Adjacent to all special fittings (regulating valves, etc.) in piping systems.
 - 6. At every access door.
- D. Piping identification shall meet the standards of the Federal Occupational Safety Health Act (OSHA) which refers to the ANSI Standard A13.1. The following standardized color code scheme shall be used:
 - Yellow - Hazardous Materials
 - Green - Liquid Materials of Inherently Low Hazard
 - Blue - Gaseous Materials of Inherently Low Hazard
 - Red - Fire Protection Materials

- E. The size of letter and length of color field shall conform to the ANSI standard and shall be as follows:

<u>Outside Diameter of Pipe or Covering</u>	<u>Length of Color Field</u>	<u>Size of Letters</u>
to 1-1/4"	8"	1/2"
1-1/2" to 2"	8"	3/4"
2-1/2" to 6"	12"	1-1/4"
8" to 10"	24"	2-1/2"
Over 10"	32"	3-1/2"

- F. All pipe labels shall be vinyl material with permanent adhesive for application to clear dry pipe and/or insulation jacketing. Each label shall have appropriate color-coded background with printed legend. Direction arrows shall be placed next to label to indicate flow direction. Color and size of arrows shall correspond to that of label. Pressure sensitive pipe tape matching the background color of the label shall be placed over each end of the label and completely around the pipe.
- G. Attach pipe markers to lower quarter of the pipe on horizontal runs and on the centerline of vertical piping where view is not obstructed. Flow indicator arrow shall point away from pipe marker.
- H. Provide the following labels, with ANSI/OSHA color for all piping systems as shown on the drawings and as listed below:

<u>Service/Legend</u>	<u>Letter Color</u>	<u>Background Color</u>
Fire Protection Water	White	Red
Fire Auto Sprinkler	White	Red
Fire Dry Standpipe	White	Red
Fire Wet Standpipe	White	Red
Fire Combination Standpipe	White	Red

2.07 IDENTIFICATION OF CONTROL SYSTEM DEVICES

- A. All automatic controls, control panels, pressure electric, electric pressure switches, relays and starters shall be clearly tagged and identified.

2.08 UNDERGROUND PIPING SYSTEM IDENTIFICATION

- A. Bury a continuous, preprinted, bright colored, plastic ribbon cable marker with each underground pipe regardless of whether encased. Locate directly over buried pipe, 6" to 8" below finished grade. Marker tape used in conjunction with buried plastic piping systems shall be special detector type. Marker tape used in conjunction with buried plastic piping systems shall be special detection type.

2.09 ACCESS DOORS

- A. Provide all access doors required for access to valves, controls, or other items for which access is required for either operation or servicing. All costs incurred through failure to perform this function as the proper sequence of this work shall be borne by the Contractor. The type of access door shall be as required by the room finish schedule. Acoustical tile access doors shall be equal to Krueger Style B, Style A for acoustical plaster, Style C-CE for sidewall drywall or plaster construction.
- B. Access doors shall be not less than 24" x 24" in size except that larger panels shall be furnished where required, and panels in tile or other similar patterned ceilings shall have dimensions corresponding to the tile or pattern module.
- C. Where access doors are installed in walls required to have a specific fire rating, the access door installed shall be a fire rated access door with UL label, as manufactured by Milcor or equivalent. Access door in 1-hour construction shall be Class C and access doors in 2-hour construction shall be Class B.

PART 3 EXECUTION

3.01 COOPERATION WITH OTHER TRADES

- A. The Contractor shall refer to other parts of these specifications covering the work of other trades which must be carried on in conjunction with the mechanical work so that the construction operations can proceed without harm to the Owner from interference, delay, or absence of coordination. The Contractor shall be responsible for the size and accuracy of all openings.

3.02 DESIGN AND DRAWINGS

- A. The complete design for the project fire suppression system including drawings, hydraulic calculations, piping sizing and arrangement, head layouts, equipment selection, etc., shall be the responsibility of Division 21 Contractor. Preparation of the fire suppression system design shall be in accordance with all Division 21 specification requirements, NFPA requirements and Authorities Having Jurisdiction.
- B. Should any doubt or question arise in respect to the true meaning of the drawings or specifications, the question shall be submitted in writing.

- C. Installation of all fire suppression equipment and piping systems shall be arranged to provide all clearances required for equipment operation, service, and maintenance, including minimum clearances required by applicable codes, manufacturer's installation instructions and as necessary for proper clearance in front of all electrical panels as defined by the National Electric Code (NEC). Piping systems shall not be routed through or above electrical equipment room or electrical equipment space designed within mechanical equipment rooms.
- D. The Contractor's attention is directed to the unique architectural design features and consideration associated with this facility which will require significantly greater levels of coordination and cooperation for the work furnished and installed under Division 21 with the associated architectural, structural, and electrical work than is normally necessary for a more typical facility.
- E. The installation of all concealed fire suppression systems shall be carefully arranged to fit within the available space without interference with adjacent mechanical, plumbing, structural and electrical systems. The Contractor shall make all necessary provisions for penetrations of piping, including sleeves and blockouts in structural systems. The exact location of all exposed fire suppression systems, including access doors; sprinkler piping exposed within finished areas; and other equipment and devices as applicable, shall be coordinated with the Architect, who shall have final authority for the acceptance of the work as it specifically relates to the architectural aesthetic design requirements for the facility.

3.03 FIELD MEASUREMENTS

- A. The Contractor shall verify the dimensions and conditions governing his work at the building. No extra compensation shall be claimed or allowed on account of differences between actual dimensions, including dimensions of equipment, fixtures and materials furnished, and those indicated on the drawings. Contractor shall examine adjoining work, on which his work is dependent for perfect efficiency, and shall report any work which must be corrected. Coordination of all fire suppression work within the building will be the direct responsibility of the Contractor. Review of submittal data in accordance with paragraph "Submittals" shall in no manner relieve the Contractor of responsibility for the proper installation of the fire suppression work within the available space. Installation of equipment and systems within the building space shall be carefully coordinated by the Division 21 Contractor with all building trades. Each contractor shall so harmonize his work with that of the several other trades that it

may be installed in the most direct and workmanlike manner without hindering or handicapping the other trades. Piping interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Sewer lines shall take precedence over water lines in determination of elevations. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork. Installation of fire suppression, plumbing and HVAC systems within the ceiling cavity shall be in the following order of priority: plumbing waste lines; supply, return, outside air, makeup, and exhaust ductwork; fire sprinkler mains; fire sprinkler branch piping and sprinkler runouts; domestic hot and cold water; control piping, wiring and conduit.

3.04 EQUIPMENT SUPPORT

- A. Contractor shall provide support for equipment to the building structure. Contractor shall furnish all necessary structures, inserts, sleeves, and hanging devices for installation of mechanical and plumbing equipment, ductwork and piping, etc. Contractor shall completely coordinate installation of such devices with all trades and Sub-Contractors. Contractor must further verify that the devices and supports are adequate as intended and do not overload the building's structural components in any way.

3.05 SEISMIC SUPPORTS

- A. The Contractor shall be responsible for all anchors and connections for the mechanical work to the building structure to prevent damage of equipment and systems due to earthquakes. The complete fire protection systems shall be supported as required to resist stresses produced by lateral forces as required by NFPA No. 13. Where fire suppression equipment and piping is connected to the building structure, exact method and means of attachment to the structural system shall be approved by the Architect.

3.06 PROTECTION OF MATERIALS AND EQUIPMENT

- A. The Contractor shall be responsible for the protection of all work, materials and equipment furnished and installed under this section of the specifications, whether incorporated in the building or not.
- B. All items of fire suppression equipment and materials, including piping, valves and fittings, etc., shall be protected from damage and contamination. Equipment and materials shall not be

stored outside and exposed to weather and ambient conditions without appropriate protection measures and without the approval of the Architect. Equipment shall be delivered to the jobsite and maintained while on the jobsite with all openings, controls and control panels covered with heavy duty polyethylene wrap or other proper means. Equipment and materials where stored within the building shall be protected at all times from construction damage and contamination from dust, dirt, debris, and especially during fireproofing, painting and gyp board sanding and finishing. Unprotected equipment and piping will require special field cleaning by the Contractor prior to acceptance by the Architect.

- C. The Contractor shall provide protection for all work where necessary and shall be responsible for all damage done to property, equipment and materials. Storage of materials within the building shall be approved by the Architect prior to such storage.
- D. Pipe openings shall be closed with caps or plugs, or covered to prevent lodgment of dirt or trash during the course of installation. At the completion of the work, fire suppression equipment and materials shall be cleaned thoroughly and delivered in a condition satisfactory to the Architect.

3.07 TRENCHING AND BACKFILLING

- A. All excavation, trenching and backfilling required for the fire suppression installation shall be provided by this Contractor.

3.08 MANUFACTURER'S INSTRUCTIONS

- A. All equipment shall be installed in strict accordance with recommendations of the manufacturer. If such recommendations conflict with plans and specifications, the Contractor shall report such conflicts to the Architect who shall make such compromises as he deems necessary and desirable.

3.09 TESTS

- A. Tests shall be conducted in the presence of the designated and authorized Owner's Representative. The Contractor shall notify the Architect a minimum of one week in advance of scheduled tests. Requirements for testing are specified under the sections covering the various systems. The Contractor shall furnish all necessary equipment, materials, and labor to perform the required tests.

3.10 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. The Contractor shall furnish complete operating and maintenance instructions covering all units of fire suppression equipment herein specified together with parts lists. Equipment spare parts shall include all components requiring service, including motors, bearings, shafts, etc. Furnish two (2) copies of all the literature; each shall be suitably bound in loose leaf book form. A "Lubrication Chart" framed under plexiglass shall be provided listing all types of oil to be used for each piece of equipment and the recommended frequency of lubrication. This chart shall be hung on the wall of the equipment room.
- B. See Division 1 for additional requirements concerning manuals, manual distribution, and maintenance materials.
- C. Operating and maintenance manuals as required herein shall be submitted for review and distribution to the Owner not less than two (2) weeks prior to the date scheduled for the Contractor to provide Operating and Maintenance Instructions to the Owner as specified herein.
- D. Upon completion of all work and all tests, the Contractor shall instruct the Owner or his representative fully in the operations, adjustment and maintenance of all equipment furnished. Contractor shall provide at least two weeks notice in advance of this period, with a written schedule of each training session, the subject of the session, the Contractors' representatives who plan to attend the session, and the time for each session.
- E. Film the instruction and training sessions submit two copies of the DVD.
- F. Equipment startup and operational test shall be conducted by the Contractor with the assistance of the representatives from the fire pump manufacturers and fire pump controller manufacturer. Test shall be conducted in the presence of the designated and authorized Owner's Representative.

3.11 CERTIFICATIONS

- A. Before receiving final payment, the Contractor shall certify in writing that all equipment furnished and all work done is in compliance with the contract documents and all applicable codes. Submit certifications and acceptance certificates, including proof of delivery of O&M manuals, spare parts required, and equipment warranties which shall be bound with O&M manuals.

3.12 INTERRUPTING SERVICES

- A. The Contractor shall coordinate the installation of all fire suppression system work in order to minimize interference with the operation of existing building mechanical, plumbing, fire protection, and utility systems during construction. Connections to existing systems requiring the interruption of service within the building shall be carefully coordinated with the Owner to minimize system downtimes. Requests for the interruption of existing services shall be submitted in writing a minimum of two (2) weeks before the scheduled date. Absolutely no interruption of the existing services will be permitted without written review and authorization.

3.13 OPERATION PRIOR TO ACCEPTANCE

- A. Operation of equipment and systems installed by the Division 21 Contractor for the benefit of the Owner prior to substantial completion will be allowed providing a written agreement between the Owner and the Contractor has established warranty and other responsibilities to the satisfaction of both parties.
- B. Operation of equipment and systems installed by the Division 21 Contractor, for the benefit of the Contractor, except for the purposes of testing and balancing will not be permitted without a written agreement between the Owner and the Contractor establishing warranty and other responsibilities.

3.14 SITE VISITS AND OBSERVATION OF CONSTRUCTION

- A. The design professional shall make periodic visits to the project site at various stages of construction in order to observe the progress and quality of various aspects of the Contractor's work, in order to determine in general if such work is proceeding in accordance with the Contract Documents. This observation, however, shall in no way release the Contractor from his complete responsibility to supervise, direct, and control all construction work and activities. The design team has no authority over, or a responsibility to means, methods, techniques, sequences, or procedures of construction provided by the Contractor or for safety precautions and programs, or for failure by the Contractor to comply with all law, regulations, and codes.

END OF SECTION

Project Name _____

Date _____

DIVISION 21 SUBSTITUTION REQUEST FORM (SRF)

TO: BRIDGERS & PAXTON CONSULTING ENGINEERS, INC.

PROJECT: _____

We hereby submit for your consideration the following product instead of the specified item for the above project:

Section: _____ Page: _____ Paragraph/Line: _____ Specified Item: _____

Proposed Substitution: _____

Attach complete product description, drawings, photographs, performance and test data, and other information necessary for evaluation. Identify specific Model Numbers, finishes, options, etc.

1. Will changes be required to building design in order to properly install proposed substitutions? YES NO
If YES, explain: _____

2. Will the undersigned pay for changes to the building design, including engineering and drawing costs, caused by requested substitutions? YES NO

3. List differences between proposed substitutions and specified item.

Specified Item	Proposed Substitution
_____	_____
_____	_____
_____	_____

4. Does substitution affect Drawing dimensions? YES NO

5. What affect does substitution have on other trades? _____

6. Does the manufacturer's warranty for proposed substitution differ from that specified? YES NO
If YES, explain: _____

7. Will substitution affect progress schedule? YES NO
If YES, explain: _____

8. Will maintenance and service parts be locally available for substitution? YES NO
If YES, explain: _____

9. Does proposed product contain asbestos in any form? YES NO

SUBMITTED BY: Firm: _____ Date: _____

Address: _____

Signature: _____ Telephone: _____

For Engineer's Use Only		
Accepted: _____	Not Accepted: _____	Received too Late: _____
By: _____	Date: _____	
Remarks: _____		

LICENSE AGREEMENT FOR CADD DATABASE OR BIM MODEL

PROJECT: _____

LICENSE GRANT: Contractor is granted use of the CADD Database or BIM Model (Database/Model) for the indicated project for the specific purpose of preparing submittal documents for this Project. No other use of the Database/Model is granted. Title to the Database/Model is not transferred to the Contractor. The Database/Model may be of value to the Contractor in preparing submittals, but use of the model does not relieve the contractor of the requirement to verify measurements in the field.

COPYING RESTRICTIONS: Contractor may copy the Database/Model in whole or in part, but only for backup and archival purposes or for use by the Contractor's Subcontractors. Contractor agrees to ensure that any entities that receive the Database/Model from Contractor, either in whole or in part, comply with the terms and conditions of this agreement. Contractor shall safeguard the Database/Model from falling into the hands of parties other than Subcontractors with a legitimate need for it.

WARRANTY: Bridgers & Paxton (B&P) offers this Database/Model without warranty and specifically without express or implied warranty of fitness. If Contractor chooses to use the Database/Model, then he does so at his own risk and without any liability or risk to B&P.

INDEMNITY: Contractor shall to the fullest extent permitted by law, defend, indemnify and hold harmless the Owner, Architect, B&P, their employees and agents from all claims, damages, losses, and attorney fees arising out of or resulting from the use of the Database/Model.

ACKNOWLEDGMENT: Contractor acknowledges that (s)he has read this Agreement, understands it, and agrees to be bound by its terms and conditions.

CONTRACTOR'S REPRESENTATIVE

Signature: _____ Company Name: _____

Name: _____ Address 1: _____

Title: _____ Address 2: _____

Date: _____

SECTION 21 0504 - PIPE AND PIPE FITTINGS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 REQUIREMENTS

- A. Conform with applicable provisions of the General Conditions, Supplemental General Conditions and General Requirements.
- B. Lead Ban: All piping, solder and flux used in the installation of piping systems furnished and installed under Division 21, shall be lead free. The term lead free is defined as pipe which does not contain more than 8.0% lead and solder and flux which does not contain more than 0.2% lead.

1.02 RELATED SECTIONS

- A. Section 21 0500 for Common Work Requirements for Fire Suppression.

1.03 SUBMITTAL DATA

- A. Contractor shall furnish complete submittal data for all piping materials, including manufacturer's specifications, certifications, class, type and schedule. Submittal data shall additionally be furnished for pipe hangers and supports, seismic restraints, pipe sleeves including sealing and fire safing materials and installation.

PART 2 PRODUCTS

See Division 21, Section 21 1315 for applicable requirements.

PART 3 EXECUTION

See Division 21, Section 21 1315 for applicable requirements.

END OF SECTION

SECTION 21 0505 - PIPING SPECIALTIES FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 REQUIREMENTS

- A. Contractor shall furnish and install all piping specialties necessary for satisfactory operation of the systems. Conform with applicable provisions of the General Conditions, Supplemental General Conditions and General Requirements.

1.02 RELATED SECTIONS

- A. Section 21 0500, Common Work Requirements for Fire Suppression.
- B. Section 21 0504, Pipe and Pipe Fittings for Fire Suppression.
- C. Section 21 0523, Valves for Fire Suppression.
- D. Section 21 0549, Fire Suppression and Electrical Installation Coordination.

1.03 SUBMITTAL DATA

- A. Contractor shall furnish complete submittal data for all piping specialties including manufacturer's specifications, performance characteristics, ratings, installation instructions, certifications and approvals of listing agencies, wiring diagrams, and selection analysis.

PART 2 PRODUCTS

See Division 23, Section 23 0505, for applicable requirements.

PART 3 EXECUTION

See Division 23, Section 23 0505, for applicable requirements.

END OF SECTION

SECTION 21 0523 - VALVES FOR FIRE SUPPRESSION**PART 1 GENERAL****1.01 REQUIREMENTS**

- A. All Valves shall conform with current applicable provisions of the General Conditions, Supplemental General Conditions, and General Requirements.
- B. All Valves shall meet the current MSS Specifications covering Bronze & Iron Valves. MSS-SP-80, MSS-SP-70, MSS-SP71, MSS-SP-85 where applicable.
- C. Lead Ban: Valves shall be lead free. The term lead free is defined as valves which do not contain more than 8.0% lead.

1.02 RELATED SECTIONS

- A. Section 21 0500, Common Work Requirements for Fire Suppression.
- B. Section 21 0523, Valve Identification for Fire Suppression.
- C. Section 21 0504, Pipe and Pipe Fittings for Fire Suppression.
- D. Division 23 for Valves.

1.03 SCOPE

- A. Contractor shall furnish and install all valves and accessories necessary for satisfactory operation of the systems.

1.04 VALVE REQUIREMENTS

- A. All Fire Suppression system valves shall be UL Listed and FM Approved. See applicable fire suppression system specification sections for additional valve requirements, including hose threads, tamper switches, etc.
- B. All Gate, Globe, Check, Ball valves shall be manufactured by Milwaukee, Nibco, Apollo, Stockham, Powell, Crane, Grinnell, or equivalent.
- C. Butterfly valves shall be as manufactured by Milwaukee, W. C. Norris, Centerline, Crane, Demco, Keystone, Grinnell, Victaulic, Nibco, or Dezurik, or equivalent.
- D. Pressure relief valves for wet pipe sprinkler system shall be AGF Manufacturing Inc. or equivalent.

PART 2 PRODUCTS

See Division 21, Section 21 1315, for applicable requirements.

PART 3 EXECUTION

See Division 21, Section 21 1315 for applicable requirements.

END OF SECTION

SECTION 21 1315 - FIRE PROTECTION SYSTEM, AUTOMATIC DRY-PIPE SPRINKLER

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Conform with applicable provisions of the General Conditions, Supplemental General Conditions and the General Requirements.
- B. See Division 3 for concrete work.
- C. See Division 26 for electrical work.
- D. See Division 28 for building fire alarm system.
- E. See Architectural Sections of this Specification for required cutting, patching, painting, etc. required in conjunction with the installation of the new sprinkler system within the existing facility.

1.02 RELATED SECTIONS

- A. Section 21 0500 Common Work Requirements
- B. Section 21 0503 Trenching and Backfilling for Mechanical Systems
- C. Section 21 0504 Pipe and Pipe Fittings
- D. Section 21 0505 Piping Specialties
- E. Section 21 0523 Valves
- F. Section 28 3100 Fire Detection and Alarm
- G. Division 22 for plumbing systems.
- H. Division 23 for HVAC systems.

1.03 SCOPE

- A. Criteria: This Section covers the requirements for furnishing the design, fabrication, installation, and acceptance testing of a complete automatic dry-pipe sprinkler system.
- B. Classification: In accordance with NFPA 13 and 101 requirements and recommendations.
- C. Scope of Work: Provide the design, materials, equipment, fabrication, installation, labor, and supervision necessary to install, disinfect, flush, test, and place into service a complete wet-pipe sprinkler system.
 - 1. Fully sprinkle the facility per NFPA-13, the International Building Code, International Fire Code, state and/or local Fire Marshal, and any specific requirements of the Owner's

insurance underwriter.

- D. Components: Provide all piping, fittings, control valves, check valves, alarm valve (with trim), pressure relief valves, tamper switches, fire department connection, post indicator valve, backflow preventers, sprinkler heads, hangers, bracing, test and drain connections, zone flow switches, tamper switches, accessories and incidentals required for a complete installation in accordance with codes and standards referenced in this Section.
- E. Protect all fire lines subject to freezing in a manner approved by NFPA. Use anti-freeze loops only as approved by NFPA and the Local Fire Marshal and only with approved backflow protection in accordance with applicable building codes. Electric heat tape will not be permitted.
- F. Conform to the applicable provisions of NFPA Standards 13 and 101 and to the requirements of the International Building Code. Unless otherwise shown on the Drawings or specified, all materials and equipment used in the installation of the fire protection systems shall be listed in the UL Fire Protection Equipment Directory, and shall be the latest design of the manufacturer. All fire hoses, threads and adapters shall match the standards of the City of Clovis.
- G. Provide temporary fire protection within all areas of the building under construction as required by the building codes and the Fire Marshal.

1.04 QUALITY ASSURANCE

- A. All materials and equipment used in the installation of the fire protection systems shall be UL listed and/or FM approved for intended use, unless stated otherwise in these specifications.
- B. Contractor Qualifications: Contractor shall be experienced, licensed and regularly engaged in the design, fabrication, and installation of automatic fire protection sprinkler systems.
- C. Certification: Welders and brazers shall be qualified per the ASME Boiler and Pressure Vessel Code, Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
- D. Employ skilled craftspersons and provide proper supervision to ensure the work is erected in a proper manner. Coordinate the work with existing conditions and other disciplines. Visit the premises and thoroughly understand the details of the work and working conditions, and verify all dimensions in the field. If discrepancies are noted which require clarification of the design intent, submit RFIs prior to performing related work. Lay out all work in a manner to avoid all interferences.

- E. The drawings show only approximate building outlines and interior construction details as an aid in understanding the scope of work. Follow the drawings as closely as building construction and the work of other trades will permit. Investigate the structural and finish conditions affecting the work and arrange the work accordingly, providing such fittings, traps, valves, and accessories as may be required to meet such conditions. Field verify all dimensions and conditions governing the work.
- F. Do not render inoperative any building system without prior approval. Coordinate necessary shutdowns through seven day advanced written notification.
- G. Coordinate all fire protection piping and sprinklers with the ceiling or roof materials, lighting, ductwork, conduits, piping, suspended equipment, structural, and other building obstructions to provide an installation in compliance with the appropriate building codes, and NFPA Standards.

1.05 EXISTING CONDITIONS

- A. Examine existing conditions and related work required for the design and installation of the fire suppression system.
- B. Perform all field tests and inspections as may be necessary to determine water flow, fire protection and pressure characteristics (static and residual pressure and residual flow) necessary for the design and installation of the fire protection system. Contact the water utility to determine whether they anticipate any degradation in the available water source. Prior to starting design, procurement, and installation, submit to the Owner and Engineer a written report documenting the results of this discussion with the water utility.

1.06 OPERATION PRIOR TO ACCEPTANCE

- A. The Owner may wish to place portions of the fire suppression systems in service prior to substantial completion. In this case, a written agreement will be prepared establishing warranty and other responsibilities to the satisfaction of both parties.

1.07 SUBMITTALS

- A. See Division 1 and Section 21 0500 for general submittal requirements.
- B. Within 45 days after the contract is awarded, provide submittal data for the complete fire suppression system for review.
 - 1. Submit sprinkler system design drawings and hydraulic calculations to the Fire Marshal, the Building Department AHJ, and the Owner's Insurer for review, comment, and

- approval.
- a. Drawings must be prepared by either a minimum Level 3 NICET Certified Technician, or a professional engineer.
 - b. Drawings must be stamped by a professional engineer registered in fire protection.
2. Upon receipt of stamped and approved system design drawings and hydraulic calculations from the Fire Marshal, the Building Department AHJ, and the Owner's Insurer, submit required sets of complete submittal data to the Architect as per spec Section 21 0500.
- C. Submit complete data describing all equipment and materials to be furnished including performance, quality, dimensions, and certifications of approving agencies. Include plans showing location and arrangement of water supply connection, control valve, fire department connections, alarm bells, tamper switches, on-site fire main routing, on-site fire hydrants and other equipment to be used; and including head layouts coordinated with lighting, plumbing and air conditioning systems. Submittals shall include the following:
1. Shop drawings.
 2. Certifications (after installation and tests are completed).
 3. Equipment list.
 4. Material list.
 5. Installation instructions.
 6. Maintenance instructions.
 7. Operating instructions.
 8. Samples, colors.
 9. Welder's certification.
 10. Catalog data (appropriate unit identified on cut).
 11. Recommended spare parts lists.
 12. Verifiable calculations.
 13. Nameplate data.
- D. Complete Package: Submit fire suppression work as a complete package to permit analysis of the system(s) and its components. Partial submittals will not be accepted.
- E. Hydraulic Calculations: Submit computerized hydraulic calculations. Maintain a minimum of 10 percent, but not less than a 5 psi buffer below the final water supply curve after accounting for required hose streams, pipe friction elevation differences, etc. Hydraulic design sprinkler system shall be in accordance with the following:

14. Sprinkler System Occupancy Hazard Classifications:
 - a. Office and Public Areas: Light Hazard
 - b. Storage Areas: Ordinary Hazard
 - c. Equipment Rooms: Ordinary Hazard
 - d. Service Areas: Ordinary Hazard
15. Minimum Density Requirements for Automatic Sprinkler Hydraulic Design:
 - a. Light Hazard Occupancy: 0.10 gpm over 1500 sf area.
 - b. Ordinary Hazard, Group 1 Occupancy: 0.15 gpm over 1500 sf area.
 - c. Ordinary Hazard, Group 2 Occupancy: 0.20 gpm over 1500 sf area.
 - d. Special Occupancy Hazard: As determined by authority having jurisdiction.
- F. Shop Drawings: Minimum 1/8" = 1'0" for plans, and 1/4" = 1'0" for details, with minimum 3/16 inch lettering. Show all piping, sprinklers, hangers, flexible couplings, roof construction, electro-mechanical devices, and occupancy of each area, including ceiling and roof heights as required by NFPA 13. Show hydraulic reference points and remote areas.
- G. Record Drawings: Provide mylar reproducible record drawings and AutoCAD 2008 files showing all work under this contract. Indicate any special systems or devices such as dry pendant heads, antifreeze loops, inspector's test connections, etc. Submit record drawings prior to requesting final payment.

1.08 PRODUCT HANDLING

- A. Materials and Equipment: Protect materials and equipment from damage during shipping, storage, and installation.
- B. Materials and Equipment Installation: Ensure materials and equipment are free of moisture, scale, corrosion, dirt, and other foreign materials prior to installation.
- C. Plugs and Cover Plates: Protect flanged openings with gasketed metal cover plates to prevent damage during shipment. Cap or plug all drains, vents, and small piping or gauge connections.
- D. Sprinkler Head Protection: Remove frangible bulb protectors after sprinkler heads are installed. Protect sprinkler heads with factory-supplied caps and covers until ceiling installation is complete.

1.09 ENVIRONMENTAL CONDITIONS

- A. The sprinkler system and system components shall be designed to operate at an elevation of 4300 feet above sea level and in freezing temperatures when exposed to outside conditions.

1.10 ALARM FACILITIES

- A. Provide water flow switches and tamper switches. Integrate these and other required sprinkler system alarm devices into the building fire alarm system provided under Division 26. Coordinate with Division 26, Fire Detection and Alarm, regarding the requirements and location of items provided under this section which must be integrated with the fire alarm system.
- B. Provide tamper switches on all required valves and devices used in conjunction with the building fire protection system.

1.11 ELECTRICAL CONNECTIONS

- A. The fire alarm system will monitor waterflow indicators, tamper switches, etc., provided under this Section.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All material and equipment furnished shall be in accordance with the following requirements and NFPA 13. All fire protection materials and equipment shall be new and unused, shall be free of defects and specifically designed for the use intended, shall conform to the requirements of NFPA 13, and shall be UL listed and FM approved, unless otherwise noted in the Specification.
- B. Any deviation to the above requirements shall be submitted to the Architect for approval. The deviation submittal shall be clearly identified as a "deviation."

2.02 PIPING MATERIAL

- A. Material Requirement: Automatic sprinkler piping shall be in accordance with this Section and NFPA 13, respectively.
- B. Underground piping, to a point 5'0" from the building perimeter, shall be as specified for underground water services Division 2 of this Specification.
- C. Underground piping within the building and to a point 5'0" from the building perimeter shall be AWWA Class 200 ductile iron water main pipe and fittings with mechanical joints. Interior of pipe and fittings shall be cement lined. Exterior of pipe and fittings shall be bituminous coating or equivalent. All changes in direction shall be adequately blocked or strapped to prevent separation of joints.

- D. Interior building piping systems shall be black steel pipe ASTM A120, or A53 Grade A or B, ERWQ or BW, Standard wall, Schedule 40. UL and FM approved thin wall (Schedule 10, minimum) ASTM A135 or A795 piping may be utilized for sprinkler system as allowed by NFPA and the Fire Marshal. Piping installed outside or exposed to outdoor ambient conditions shall be galvanized.

2.03 FITTINGS

- A. Changes of direction shall be accomplished by the use of fittings suitable for use in sprinkler systems as defined in Article 3-13 of NFPA 13. Fittings installed outside or exposed to outdoor ambient conditions shall be galvanized.
- B. Fittings and specials for ductile iron pipe shall be Class 250 to match pipe, conforming to AWWA C110, mechanical flange joint type. All ductile iron fittings shall be cement lined.
- C. Fittings for steel pipe shall be cast iron screwed, welded fittings, or UL and FM approved mechanical pipe couplings and fittings as manufactured by Victaulic or equivalent in accordance with requirements specified in Section 21 0504. Braided and unbraided flexible sprinkler connections which are UL listed and FM approved are acceptable products.

2.04 JOINTS

- A. Joints shall be provided in accordance with Section 21 0504, Pipe and Pipe Fittings, and the manufacturer's instructions. Threaded joints for thin-wall (Schedule 10) piping shall be provided in strict accordance with NFPA requirements, UL and FM approvals for threadable thin-wall piping.

2.05 UNIONS AND FLANGES

- A. Unions and flanges shall be provided in accordance with Section 21 0504, Pipe and Pipe Fittings. Gaskets shall be as recommended by the manufacturer and suitable for service on which used.

2.06 HANGERS AND SUPPORTS

- A. See Section 21 0504, Pipe and Pipe Fittings, for general requirements associated with equipment piping systems hangers and supports. Seismic supports for fire protection system shall be provided in accordance with NFPA requirements.

- B. All fire protection piping shall be rigidly supported from the building structure by means of adjustable ring type hangers. Piping hangers shall be spaced as specified in NFPA 13, Chapter 2. Piping system shall be installed in an approved manner and shall not overload the structure. The Contractor shall provide additional hangers and steel support members as may be required to distribute the piping weight over several structural members where required or directed. Fire protection piping system shall be supported independent and shall not be attached or supported from hangers, trapezes, or supports provided for other piping systems or equipment.

2.07 VALVES

- A. See Section 21 0523, Valves, for general valve requirements. All valves for fire hose fire department connections shall have threads and adapters to match the standard of the City of Clovis Fire Department. All valves shall be UL listed and FM approved. Valve sizes shall be determined by the approved hydraulic calculations. Outside screw and yoke valves shall be indicated on the approved hydraulic calculations. Tamper switches shall be provided on all valves controlling fire protection system operation, as required by NFPA. Valves shall be rated for working pressure not less than the maximum pressure to be developed at that point in the system under any operating condition.
- B. Gate valves 2" and under, shall be bronze body and trim, outside screw and yoke, wedge disc, screwed connections, 400 psi W.O.G. maximum working pressure.
- C. Gate valves, 2-1/2" and larger, shall be Class 125 or Class 250, as required, with flanged ends, outside screw and yoke, bronze seals, wedge disc, iron body.
- D. Drain valves shall be globe valve or angle body globe valve, with screwed ends, bronze body and trim, 200 psig W.O.G. maximum working pressure. Furnish and install as required by NFPA No. 13.
- E. Swing check valves 2" and smaller shall be y-pattern, horizontal swing bronze body, bronze trim, 200 psig W.O.G. screwed connections.
- F. Swing check valves 2-1/2" and larger, shall be iron body, clearway swing check, Class 125 or Class 250 as required with flanged or grooved connections.
- G. Automatic Ball Drips: Automatic ball drips shall be 1/2" or 3/4" as required normally open, which close when the flow of water through the valve exceeds 4 to 10 gpm, 175 psig working pressure, Underwriters' Laboratories, Inc., or Factory Mutual approved, Standard Fire West No. 5248 or equivalent.

- H. Post indicator fire main control valve location, type and requirements shall be coordinated with local water authority and fire marshal. Coordinate with AHJ for PIV type and location approval. PIV shall have, Underwriters' Laboratories, and Factory Mutual approved pattern with approved gate valve and tamper switch. Vertical post indicator shall be Mueller Co. Model A-20804 with Mueller AWWA non-rising stem gate valve, A-2050 Series or equivalent. Wall type indicator shall be Mueller A-20810 or equivalent.

2.08 SYSTEM CONTROL VALVE, DRY-PIPE VALVE

- A. Pressure Rating: 175 psig minimum.
- B. Body Material: Cast or ductile iron.
- C. Size: Same as connected piping.
- D. End Connections: Flanged or grooved.
- E. Standards:
 - 1. UL 260.
 - 2. UL 1486.
- F. Design: Differential-pressure type.
- G. Include quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gauges, priming chamber attachment, and fill-line attachment.
- H. Air-Pressure Maintenance Device for Dry-Pipe Valve:
 - 1. Standard: UL 260.
 - 2. Description: Automatic device to maintain minimum air pressure in piping.
 - 3. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14 to 60 psig adjustable range, and 175 psig outlet pressure.

2.09 DRY-SPRINKLER SYSTEM NITROGEN GENERATOR WITH PURGE/VENT

- A. Provide nitrogen generator system to serve dry sprinkler zones for piping corrosion mitigation, including system venting. System is to provide required supervisory pressure within sprinkler zone. System is to include either an integrated, oil-less air compressor, located within the nitrogen generator system package, or a separate vibration-isolation mounted air compressor, also provided by nitrogen generator manufacturer.
- B. Standards:
 - 1. FM 1035.

2. UL 508A.
- C. Nitrogen Generator:
1. Skid-mounted or stand-alone nitrogen generator to provide minimum nitrogen purity of 98 percent to the designated sprinkler systems.
 2. Power: 120 V ac.
 3. Bypass mode and nitrogen-generating mode.
 4. Minimum Capacity: As recommended by manufacturer
- D. Air Compressor:
1. Motor Horsepower: Fractional.
 2. Power: 120 V ac, 60 Hz, single phase.
 3. Sized for application and capable of achieving system supervisory pressure within 30 minutes in accordance with requirements of NFPA 13. Provide ASME air receiver tank as required to meet requirements on larger systems.
 4. Include filters, relief valves, coolers, automatic drains, and gauges.
 5. Minimum Capacity: Match capacity of nitrogen generator.
- E. Automatic Purge Vent/Valve:
1. Vents oxygen during system nitrogen fill.
 2. Automatically closes when 98 percent minimum nitrogen has been reached.
 3. Sized to allow correct purge rate per manufacturer's written instructions and with 14 days.
 4. Provide one venting device for each dry/preaction sprinkler system zone.
 5. Include a connection port for a portable nitrogen purity sensor or a nitrogen purity manifold.
- F. Supervisory Gas Monitoring - Nitrogen Purity Sensing Device:
1. Permanently Mounted Nitrogen Purity Monitoring Device or Manifold: Permanent monitoring device to continuously monitor system's nitrogen purity.
- G. Alarm Integration:
1. Provide nitrogen-generation system with integrated leak-detection and bypass alarms. Program alarms into Fire Alarm controller.
 2. Leak-detection system is to alarm if leaks develop within fire-suppression system piping.
 3. Air bypass alarm is to activate if nitrogen-generation system is bypassed by air compressor.

2.10 ALARM CHECK VALVES

- A. Furnish complete wet-pipe sprinkler system alarm check valve assembly with all accessories required for system operation, supervision and alarm. Valves shall be UL listed and FM approved, designed to automatically activate electrically and/or hydraulically operated alarms and shall be furnished in the required size and arrangement with either flanged or grooved connections.
- B. Furnish retard chamber, pressure gauges, valves, and trim including water motor gong and alarm switch with both normally open and normally closed electrical contacts.
- C. Alarm check valve assembly shall be as manufactured by Tyco Fire Products or equivalent.

2.11 PRESSURE RELIEF VALVE

- A. Furnish relief valve shall be minimum ½" size and set to operate at 175 psi or 10 psi in excess of the maximum system pressure, whichever is greater.

2.12 PRESSURE GAUGES

- A. Pressure gauges shall be designed for use with water. Gauges shall be of the Bourdon type having an enclosed phosphor-bronze type. The moving parts shall be brass or stainless steel except the hairspring, which is phosphor-bronze. The case and ring shall be brass or stainless steel, and the ring shall be either threaded or pressed over the case. Gauges shall be 4-1/2 inch size with dial marking subdivisions no finer than one percent of the maximum scale reading, and shall be accurate to two percent or less. The gauge scale, when possible, shall be at least twice the maximum working pressure. All gauges shall be FM approved and UL listed.

2.13 TAMPER SWITCHES

- A. All valves which control water to automatic sprinkler heads shall be equipped with supervisory switches having one normally open contact and one normally closed contact. Valve supervisory switches shall be single pole double throw switching contacts, and shall be housed in a gasketed weathertight enclosure. The supervisory device supplied shall be specifically designed to mount on, and operate reliably with, the type of control valve being monitored. All valve position switches shall be adjusted to transmit a supervisory signal within two revolutions of the valve operating hand wheel or crank (away from its full open position).

2.14 FLOW SWITCHES

- A. Water flow switches shall be field adjustable vane-type with pneumatic retard and 175 psi working pressure. Units shall be single pole double throw, normally open, suitable for 24-volt, DC service or as otherwise required to interface with Building Fire Alarm system. Water flow switches shall be adjusted so that the device will transmit a water flow alarm within 90 seconds of opening the inspector's test valve on the sprinkler system. The flow switch shall be furnished and installed under this Section of Specifications and electrically connected under Division 26. Flow switches when required for zoning shall be piped and installed so that only one flow switch actuates when an alarm in that zone is present.

2.15 SPRINKLER HEADS

- A. Sprinkler heads and accessories shall be UL listed or FM approved for the intended service, quick response automatic closed type, 165 deg F rated with 1/2" orifice, except as may be otherwise required for the specific application, and subject to NFPA 13 and 101 requirements and recommendations. Sprinkler heads with higher temperature ratings shall be installed in electrical and mechanical equipment areas, in areas where occupancy may generate high ambient temperatures, where installed in the vicinity of heat producing equipment, attic spaces, where exposed to the direct rays of the sun and beneath skylights and windows, and at other such locations as required by NFPA 13.
- B. Sprinkler heads installed in unfinished areas without suspended ceilings shall be upright bronze or brass. Sidewall type heads may be used in areas with low headroom as approved by the Fire Marshal.
- C. Sprinkler heads in areas with suspended ceilings shall be chrome plated bronze pendant type. Sidewall heads in finished areas shall be horizontal, chrome plated bronze.
- D. Supply spare heads of each type as required by NFPA 13. Provide a metal cabinet with a sprinkler head wrench for each type head.
- E. Provide sprinkler head guards where required by NFPA 13 and where appropriate.
- F. Approved Manufacturers: Tyco Fire Products, Viking, or equivalent.

2.16 SYSTEM ACCESSORIES

- A. Fire Department Connections: Fire department connections shall be of the type and style shown on the fire protection drawings, cast brass body, double clappers, plugs, and attached chains.

All exposed surfaces, caps and chains shall be chrome plated. Identification shall be by raised letters on the individual devices, or shall consist of attached escutcheon plates of the same material. Label shall read "AUTO SPKR". The dimension from grade level to the center of the 2-1/2-inch inlets shall be 34 inches (plus or minus 2 inches). Make the fire department connection above the inlet to the alarm valve.

- B. Plaques: Main riser plaques shall be 7 inches by 10 inches with four mounting holes (one in each corner), and shall have white lettering on red porcelain with white blank for the "design data." Plaque shall meet all requirements of NFPA 13, Chapter 7.
- C. Strainers: Strainers, where required, shall be "Y" type with cast iron body, 30 mesh monel screen, flanged ends, 1-1/2-inch blow down connection discharging to outside, and shall be rated at 175 psi working pressure for cold water service.
- D. Splash Blocks: Splash blocks shall be concrete, 12 inches by 24 inches by 4 inches thick. A commercially available splash block may be provided as a suitable alternate.

2.17 ACCESS DOORS

- A. All concealed valves, controls, etc., shall be provided with access doors as specified under Section 21 0500, Common Work Requirements.

PART 3 - EXECUTION

3.01 FIELD CONDITIONS

- A. Prior to installation the Contractor shall carefully inspect the installed work of all other trades and verify that all such work is complete to the point where the installation of the sprinkler system may properly commence.
- B. The Contractor shall verify that the entire sprinkler system may be installed in accordance with all referenced codes, regulations, standards, and the original approved design.

3.02 INSTALLATION

- A. General
 - 1. The complete fire protection system shall be installed in accordance with NFPA 13. The project drawings provide general information concerning the system arrangements, equipment, material, sizes, and other requirements and shall be utilized by the Contractor for this purpose. However, the Contractor shall have complete responsibility for the system design and installation in accordance with the requirements of this Specification.

2. All pipe, fittings, valves, equipment, and accessories shall be visually examined to ensure that they are clean and free of all burrs, cracks, and other imperfections before being installed. During the progress of construction, open ends of pipes, fittings, and valves shall be properly protected at all times to prevent admission of foreign matter.

B. Piping

1. Installation of fire sprinkler piping system shall be in accordance with all applicable requirements contained in Section 21 0500 – Common Work Requirements, Section 21 0504 – Pipe and Pipe Fittings, and Section 21 0505 – Piping Specialties.
2. All fire sprinkler piping shall be so arranged and include such devices to separate the system into individual and distinct alarm zones as shown on the contract drawings and as required by NFPA recommendation and the Fire Marshal. A minimum of one zone per floor will be required unless shown otherwise on the contract drawings.
3. Sprinkler piping shall be marked and identified in accordance with Section 21 0500, Common Work Requirements.
4. The arrangements of all piping systems shall conform to Architectural requirements and field conditions, and shall be run straight and direct, forming right angles or parallel lines with building walls and other pipes, and shall be neatly spaced. Offsets will be provided where required. Standard fittings shall be used for offsets. All risers shall be erected plumb and true, and shall be parallel with the walls and other pipes and shall be neatly spaced. All work shall be coordinated with all Sections of Division 21, 22, and 23, and Division 26, "Electrical," in order to avoid interference of pipe and unnecessary cutting of floors and walls.
5. No pipes or other apparatus shall be installed so as to interfere in any way with the full swing of the building doors, access doors, equipment access, etc.
6. Inspector's test and test pipes shall be piped from the end of the most remote branch line of the automatic sprinkler system to the exterior of the building.
7. When trapped capacity is more than five gallons, provide auxiliary drains consisting of a one-inch valve, nipple, and cap. When trapped capacity is less than five gallons, auxiliary drain shall be one-inch nipple and cap or plug.
8. Provide main drain valves at system alarm valves and extend piping to discharge at exterior at a location approved by the Architect. All pipe and fittings downstream of drain valve shall be galvanized.

9. All concrete penetrations shall be sleeved, then grouted and sealed with fire-resistive material that shall be securely held in place.
 10. Locate pressure relief valve at the system high point to a minimum 1" branch takeoff. Pipe relief drain to the building exterior at a location approved by the Architect. Provide with sign in accordance with Section 21 0500.
 11. Drain dry-type fire-suppression system piping.
- C. Welding
1. No field welding of sprinkler piping shall be permitted.
 2. Headers, risers, feed, crossmains, and branch lines may be shop welded using approved welding fittings. Welding and brazing shall conform to American National Standard Institute for Power Piping, ANSI B 31.10, with Addenda ANSI B 31.10a and ANSI B 31.10b. Welding and torch cutting shall not be permitted as a means of installing or repairing sprinkler systems.
 3. Provide a blind flange at each end of welded headers.
 4. Welders and brazers shall be certified for welding and/or brazing in accordance with the requirements of ASME Boiler and Pressure Vessel Code, Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators. Welders must be certified for work they perform, and certificates shall be checked before the work commences.
- D. Alarm Check Valve: Alarm check valves shall be installed with the valve and trim set plumb, and shall be unobstructed. Clear distances shall be as listed below:
- | | |
|--------|-----------|
| Rear: | 12 inches |
| Sides: | 18 inches |
| Front: | 24 inches |
- E. Control Valves: OS&Y fire protection control valves shall be installed so that the stem can be readily seen.
- F. Install dry-pipe valves with trim sets for air supply, drain, priming level, alarm connections, ball-drip valves, pressure gauges, priming chamber attachment, and fill-line attachment.
- G. Sprinklers and Accessories
1. Sprinkler heads in finished areas are to be installed on a true axis line in both directions with a maximum deviation from the axis line of 1/2" plus or minus. Heads exceeding this shall be removed and reinstalled. Sprinkler heads shall be located in the center of the ceiling tiles, unless otherwise directed.

2. Provide chrome-plated escutcheons where exposed piping passes through finished floors, walls, partitions, and ceilings. Secure plates to pipe with setscrews or spring clips.
3. Provide spare sprinkler head cabinets per NFPA 13.

H. INSTALLATION OF NITROGEN GENERATOR WITH PURGE/VENT SYSTEM

1. Install in accordance with manufacturer's written installation instructions.
2. Locate purge vent/valve in accordance with manufacturer's written installation instructions.

3.03 EQUIPMENT INSTALLATION

- A. Installation of all devices or equipment not specifically covered by these Specifications shall be in accordance with manufacturer's instructions.

3.04 TEMPORARY FIRE PROTECTION

- A. During the construction of the building and until the permanent fire extinguishing system has been installed and is in service, temporary fire protection shall be provided as required by the Fire Marshal.

3.05 INSPECTION AND TESTING

- A. The complete fire protection systems and piping acceptance testing shall be performed by the Contractor and witnessed. Advance notice shall be given by the Contractor prior to any tests.
- B. Inspection Prior to Testing: The Contractor shall submit notification upon completion of the installation of all materials and equipment.
- C. Water Piping Disinfection: The Contractor shall furnish all hoses, connections, and equipment to flush piping clear and free of debris and to rinse piping of disinfectant. Flushing per NFPA Figure A-10.10-2.1. All fittings and connections required for water piping, flushing, and disinfection shall be furnished by the Contractor.
- D. Chlorine Application: Water from the existing distribution system, or other approved supply source, shall be made to flow at a constant measured rate into the newly installed piping. The water shall receive a minimum chlorine dosage of 300 mg/l. The Contractor shall not allow any anti-freeze glycerine to come in contact with the chlorine. The chlorine shall be applied continuously and for a sufficient period to develop a solid column of chlorinated water that will expose all interior surfaces to a concentration of at least 30 mg/l for at least three hours. The application shall be checked at a tap near the downstream end of the line by chlorine residual

measure. The chlorine residual measurement test shall be performed by the Contractor and the results submitted.

- E. Final Flushing: After the applicable retention period, the heavily chlorinated water in the entire system shall be flushed until the chlorine concentration is not higher than that of the source.
- F. Pressure Testing: Pressure tests shall consist of at least flushing, hydrostatic testing, and operation testing and shall be performed in strict accordance with the requirements of NFPA 13. For all above-grade piping, test pressure of 200 psi shall be held for a continuous period of two hours with no drop in pressure. Each complete system (main riser with all associated piping and alarms) shall be tested and accepted as a complete unit. System pressure test shall be against a blank test flange and not against a valve seat. Tests may be conducted by the Contractor on small sections of each complete unit for the benefit of the Contractor. An air pressure test may be provided in accordance with NFPA 13. An air pressure of 40 psig shall be pumped up, allowed to stand 24 hours, and all leaks which allow a loss of pressure over 1.5 psig during the 24 hours shall be fixed.
- G. Unsatisfactory Tests: If any of the above tests fail to produce satisfactory results, tests shall be repeated at no additional cost to the Owner until satisfactory results have been obtained.

3.06 CERTIFICATION

- A. The Contractor shall certify that the system has been installed in accordance with all referenced codes and standards. The Contractor shall submit this certification upon completion of tests.

3.07 MAINTENANCE AND OPERATING INSTRUCTIONS

- A. System description, system theory of operation, and system final inspection and acceptance documents of the completed system shall be submitted in a bound book (four copies). The maintenance manuals and instructions shall include a brief description of the type of system installed, routine-type work defined by step-by-step instructions that should be performed to ensure long life and proper operations, and the recommended frequency of performance. The instructions shall also include possible trouble spots with diagnosis and suggested correction of each. The theory of operation brochures shall describe the function of each component or subassembly. A copy of the completed Contractor's Materials and Test Certificate (reference NFPA-13, Chapter 24) shall be included to document the final inspection, operating test, acceptance and placement of system in service.

END OF SECTION

SECTION 22 0500 - COMMON WORK REQUIREMENTS FOR PLUMBING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. See General Conditions and Supplemental General Conditions.
- B. The requirements listed under General Conditions and Supplemental General Conditions and the General Requirements are applicable to this section and all subsequent Sections of Division 22 and form a part of the contract.
- C. Division 21 for Fire Suppression Systems.
- D. Division 23 for Heating, Ventilating & Air Conditioning (HVAC) Systems.
- E. Division 26 for Electrical Systems.
- F. Division 31 for Trenching, Backfilling and Compaction requirements.
- G. Division 33 for requirements of site utility systems including sanitary sewer, storm sewer, domestic water distribution system.
- H. All electrical work, regardless of voltage which is provided under Division 22 shall comply with the requirements of the National Electric Code (NEC) and Division 26.

1.02 PLUMBING DIVISION INDEX

- A. Section 22 0500 Common Work Requirements for Plumbing
- B. Section 22 0504 Pipe and Pipe Fittings for Plumbing
- C. Section 22 0505 Piping Specialties for Plumbing
- D. Section 22 0523 Valves for Plumbing
- E. Section 22 0549 Plumbing and Electrical Installation Coordination
- F. Section 22 0700 Plumbing Insulation
- G. Section 22 1100 Domestic Water Piping
- H. Section 22 1123 Facility Natural Gas System
- I. Section 22 1316 Sanitary Waste and Vent Piping
- J. Section 22 4000 Plumbing Fixtures and Trim

1.03 CODES AND PERMITS

- A. The plumbing work shall be performed in strict accordance with the applicable provisions of the International Building Code, 2012 Edition; the Uniform Plumbing Code, 2021 Edition; the

Uniform

Mechanical Code, 2021 Edition and the International Fire Code, 2012 Edition as adopted and interpreted by the State of New Mexico, City of Clovis, and the National Fire Protection Association (NFPA Regulations), current adopted edition, regarding plumbing systems and electrical systems. All materials and labor necessary to comply with rules, regulations and ordinances shall be provided. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern. The Contractor shall hold and save the Architect free and harmless from liability of any nature or kind arising from his failure to comply with codes and ordinances.

- B. Permits necessary for performance of the work shall be secured and paid for by the Contractor. All utility connections, extensions, meter pits and meter sets and tap fees for water, storm sewer, sanitary sewer and natural gas shall be paid for by the Contractor, unless otherwise specified herein. See Division 33 for all requirements associated with utility permits and fees, connections, extensions, meter pits, and meter sets.
- C. The following lists some applicable codes and standards that shall be followed.

- Applicable county and state mechanical, electrical, gas, plumbing, health and sanitary codes, laws and ordinances.

- National Electrical Manufacturer's Association Standards

- National Electrical Code

- Underwriters Laboratories, Inc. Standards

- American National Standards Institute

- American Society for Testing Materials Standards

- Standards and requirements of local utility companies.

- National Fire Protection Association Standards

- American Society of Mechanical Engineers Boiler and Pressure Vessel Codes

- Occupational Safety and Health Act

- Commercial and Industrial Insulation Standards (MICA)

- American Gas Association

- The American Society of Sanitary Engineering

- National Sanitation Foundation

1.04 RECORD DRAWINGS

- A. See Division 1, for requirements associated with Project Record Drawings.

- B. The Contractor shall be responsible to maintain a complete and accurate set of marked up blue-line prints showing information on the installed location and arrangement of all plumbing work, and in particular, where changes were made during construction. The Contractor shall be responsible for keeping record drawings accurate and up-to-date throughout the construction period. Record drawings may be reviewed and checked by the Architect during the construction and in conjunction with review and approval of monthly pay requests. Contractor shall include copies of all addenda, RFI's, bulletins, and change orders neatly taped or attached to record drawing set.
- C. After installation and acceptance of direct buried underground piping and service lines in trenches, the Contractor shall take 'as-built' measurements, including all depths, prior to commencement of backfilling operations. It will not be sufficient to check off line locations. Definite measurements shall be taken for each service line. The location of buried piping and trench service lines shall be shown on the drawings and dimensioned from fixed points.

1.05 QUALIFICATIONS

- A. All mechanics shall be skilled in their respective trade.
- B. All welders shall be certified in accordance with the ASME Boiler Test Code, Section IX, latest issue.

1.06 QUALIFICATION PROCEDURES

- A. The storage, handling, and transportation of all refrigerants, oils, lubricants, etc. shall be accomplished in strict compliance with all State, local, and Federal Regulations including all requirements set forth by the Environmental Protection Agency (EPA) for the safe handling of regulated refrigerants and materials. The Contractor shall utilize qualified and/or certified personnel and equipment as prescribed by these requirements. In no situation shall any refrigerant be discharged to the atmosphere.

1.07 HAZARDOUS CONDITIONS

- A. Protruding metal (bolts, steel angles, etc.) potentially hazardous to maintenance and operation personnel, shall be cut back and/or protected to reduce the risk of injury.

1.08 HAZARD SIGNS

- A. Equipment rooms, fan plenums, and similar areas containing moving or rotating parts, or other

potentially hazardous environments shall include signs on all doors entering such spaces that shall

read similar to the following: "Hazardous Area - Authorized Personnel Only."

- B. Confined Spaces: Areas designated by OSHA Standard 1910.146 as a confined space shall be marked with a sign that reads "Confined Space - Entry by authorized personnel only, by permit."
 - 1. "Confined Space" means a space that:
 - 2. Is large enough and so configured that an employee can bodily enter and perform assigned work; and
 - 3. Has limited or restricted means for entry or exit (for example, tanks, vessels, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
 - 4. Is not designed for continuous employee occupancy.
- C. The Contractor shall survey the final premises to determine where any such potentially hazardous areas exist. If the Contractor feels that hazards exist which cannot be suitably provided for through the above typical methods, he shall forward in writing his concerns, and request for a decision concerning the referenced hazard, prior to the final inspection of the facilities.

1.09 SUBMITTALS

- A. The Contractor shall submit submittal brochures of all equipment, fixtures and materials to be furnished under Division 22, including but not limited to the following:
 - 1. Piping materials, valves, insulation materials and installation methods, vibration isolation devices, pipe penetration installation methods and products for fire rated assemblies, and all plumbing equipment listed on equipment schedules, and in related construction documents.
 - 2. Materials, certification, shop drawings, and other information as specified in the individual Division 22 Specification Sections within this Specification.
- B. Unauthorized Substitutions: If substitute materials, equipment or systems are installed without prior review or are installed in a manner which is not in conformance with the requirement of this Specification and for which the Contractor has not received a written review, removal of all the unauthorized materials and installation of those indicated or specified shall be provided at no change in contract amount.
- C. All equipment shall be installed in accordance with the manufacturer's recommendations. Provide all accessories and components for optimum operation as recommended by the manufacturer.
- D. Expense: All costs for the preparation, correction, delivery, and return of the submittals shall be

borne by the Contractor.

- E. Submittals and one resubmittal will be reviewed by the Architect/Engineer. If the Contractor fails to provide the required data with his second submittal, he will be charged for the third and subsequent reviews.
- F. See Division 1 for additional submission requirements.
- G. Complete data must be furnished showing performance, quality and dimensions. No equipment or materials shall be purchased prior to receiving written notification that submittals have been reviewed and marked either "NO EXCEPTIONS TAKEN" or "EXCEPTIONS AS NOTED." Submittals returned marked "EXCEPTIONS AS NOTED" do not require resubmittal provided that the Contractor agrees to comply with all exceptions noted in the submittal, and so states in a letter.
- H. Review of Submittals: Submittals will be reviewed with reasonable promptness, but only for conformance with the design concept of the Project and for conformance with the information indicated on the Drawings and stated in the Specifications. Review of a separate item as such will not indicate review of the assembly in which the item functions. Review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents, nor for errors or omissions in the submittals; or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, functioning and completion of the work. Review shall not relieve the Contractor of responsibility for the equipment fitting within the allotted space shown on the drawings with all clearances required for equipment operation, service and maintenance including minimum clearances required by applicable codes, manufacturer's installation instructions and as necessary for proper clearance in front of all electrical panels as defined by the National Electric Code (NEC). Any relocation of plumbing and/or electrical equipment, materials and systems required to comply with minimum clearances shall be provided by the Contractor without additional cost under the Contract.
- I. Shop drawings will be returned unchecked unless the following information is included: cover sheet shall be provided for each submittal of equipment, products and material proposed for use on the project. A common cover sheet for similar equipment (example: all air handling units or all fire protection products) is acceptable. The cover sheet shall list equipment by symbol number; reference all pertinent data in the Specifications or on the drawings; provide size and characteristics of the equipment, name of the project and a space large enough to accept a review

stamp. The data submitted shall reflect the actual equipment performance under the specified conditions and shall not be a copy of the scheduled data on the drawings. Cover sheet shall clearly identify any deviations from the specifications for submitted equipment, products, and materials.

- J. Use of substitutions reviewed and checked by the Engineer does not relieve the Contractor from compliance with the Contract Documents. Contractor shall bear all extra expense resulting from the use of any substitutions where substitutions affect adjoining or related work required in this Division or other Divisions of this Specification.
- K. If Contractor substitutes equipment for that drawn to scale on the drawings, he shall prepare a 1/4" = 1'-0" installation drawing for each equipment room where a substitution is made, using dimensions of substituted equipment, and including piping, and electrical equipment requirements, to verify that equipment will fit space with adequate clearances for maintenance. This 1/4" = 1'-0" fabrication drawing shall be submitted for review with the shop drawing submittals of the substitution. Failure to comply with this requirement will result in the shop drawings being returned unchecked.

1.10 USE OF CADD FILES

- A. Under certain conditions, the Contractor will be permitted the use of the Engineer's CADD files for documentation of as-builts, submittals, or coordination drawings.
- B. The Engineer shall be compensated for the time required to format the CADD files for delivery to the Contractor. Such work may include removal of title blocks, professional seals, calculations, proprietary information, etc.
- C. The Contractor shall complete the enclosed License, Indemnity and Warranty Agreement, complete with contractor's name, address, and Contractor's Representative signature prior to request for CADD file usage.

1.11 PRIOR APPROVAL

- A. Prior approval (approval prior to bid) of alternate mechanical equipment suppliers and service providers is not required. Please do not request prior approval. Alternate manufacturers and service providers may be submitted after bid in accordance with the submittal process provided they meet or exceed the specifications and the indicated design intent.

1.12 GUARANTEE-WARRANTY

- A. See Division 1 for warranties.
- B. The following guarantee is a part of the specifications and shall be binding on the Contractor:
 - "The Contractor guarantees that this installation is free from defects. He agrees to replace or repair any part of the installation which may fail within a period of one year after date established below, provided that such failure is due to defects in the materials or workmanship

or to failure to follow the specifications and drawings. Warranty of the Contractor-furnished equipment or systems shall begin on the date the system or equipment is placed in operation for beneficial use of the Owner or occupancy by the Owner, whichever occurs first; such date will be determined in writing, by means of issuing a 'Certificate of Substantial Completion', AIA Form G704", or equivalent.

- C. The extent of guarantees or warranties by Equipment and/or Materials Manufacturers shall not diminish the requirements of the Contractor's guarantee-warranty to the Owner.
- D. All items of plumbing equipment shall be provided with a full one (1)

PART 2 PRODUCTS

2.01 QUALITY OF MATERIALS

- A. All equipment and materials shall be new, and shall be the standard product of manufacturers regularly engaged in the production of plumbing equipment and shall be the manufacturer's latest design. Specific equipment, shown in schedules on drawings and specified herein, is to set forth a standard of quality and operation.
- B. Hazardous or Environmentally Damaging Materials: Products shall not contain asbestos, mercury, PCS, or other materials harmful to people or the environment.

2.02 ALTITUDE RATINGS

- A. Unless otherwise noted, all specified equipment capacities are for an altitude of 4600 feet above sea level and adjustments to manufacturer's ratings must be made accordingly.

2.03 ELECTRICAL SERVICES - MOTORS

- A. Each motor, unless otherwise specified of 3/4 HP and greater, shall be designed for operation with 3 phase, 60 Hz, 208 volt electrical service. Unless otherwise specified, motors of 1/2 hp and less shall be designed for operation with single phase, 60 Hz, 120 volt electrical service. Motors shall be 1750 RPM, squirrel cage, normal starting torque and normal starting current, in accordance with NEMA standards unless otherwise specified.
- B. All T-frame, ODP motors 5 HP and above shall be premium efficiency motors with a minimum power factor of 0.85 on 1800 RPM motors and a minimum efficiency rating in accordance with IEEE Standard 112, Test Method 'B' as scheduled below. In addition, all motors used in conjunction with variable frequency drives shall be premium efficiency.

NEMA EFFICIENCY	
Motor Horsepower	Efficiency, Minimum
5	90.2
7-1/2	91.0
10	91.7
15	92.4
20	93.0

- C. Motors, including premium efficiency motors shall be manufactured by General Electric Baldor, Louis Allis (Spartan), Marathon, Reliance Electric, Westinghouse, or equivalent having equal efficiencies.
- D. Special motors as may be necessary by the application and as specified herein and on the drawings include C-FACE, totally enclosed fan cooled (TEFC), explosion-proof, etc., shall be provided as required and shall be furnished manufacturer's premium efficiency rating for 5 HP and larger.
- E. Each motor shall be of the horsepower as specified and suitable for use at an altitude of 4600 feet. All motors shall have grease lubricated sealed ball bearings. Motors larger than 1 HP shall have a standard grease fitting "Zerk" and a separate grease relief tapping. Motors shall be factory lubricated. Motors shall be commercially dynamically balanced and tested at the factory before shipment and shall be selected for quiet operation. The Contractor shall line up motors and drives and place motors and equipment on foundations ready for operation.
- F. Unless indicated otherwise, motors shall be NEMA design B with a service factor of 1.15 with 40°C rise and total temperature rise of 65°C ambient and when powered from the system voltage feeding the motor. TEFC motors shall have a service factor of 1.00 with total temperature rise of 65°C in the above conditions. Motors located in areas exceeding 40°C in the ambient shall be factory rated for the ambient temperature of the motor environment. Single phase motors shall generally be NEMA Type N split phase induction motors with built-in thermal protectors. Unless otherwise specified for a particular application use electric motors with the following requirements.
1. Single-phase Motors: Capacitor-start type for hard starting applications. Motors for centrifugal fans and pumps may be split phase or permanent split capacitor (PSC).
 2. Polyphase Motors: NEMA Design B, Squirrel cage, induction type. Each two speed motor shall have two separate windings.

3. Rating: Continuous duty at 100% capacity in an ambient temperature of 40°C.

- G. If the Division 22 Contractor proposes to furnish motors varying in horsepower and/or characteristics from those specified, he shall first submit his request for the change and shall then coordinate the change with Division 26 and shall pay all additional charges in connection with the change.

2.04 ELECTRICAL WIRING AND CONTROL EQUIPMENT

- A. All wiring and conduit shall be furnished and installed as scheduled in Section 22 0549, Plumbing and Electrical Installation Coordination, unless otherwise noted or directed.
- B. The Contractor shall coordinate completely with all trades and Sub-Contractors as required to ensure that all necessary components of control work are included and fully understood. No additional cost shall accrue to the Owner as a result of lack of such coordination.
- C. The piping system may be bonded to the electrical ground bus at the electrical service equipment, but shall not under any circumstances be used as the main grounding electrode for the electrical service.

2.05 PAINTING

- A. All finish painting of plumbing systems and equipment will be under "Painting," unless equipment is hereinafter specified to be provided with factory applied finish coats.
- B. All equipment shall be provided with factory applied prime finish, unless otherwise specified.
- C. Touch-Up: If the factory finish on any equipment is damaged in shipment or during construction of the building, the equipment shall be refinished.

2.06 COUPLING GUARDS

- A. All flexibly connected pumps shall be provided with protective steel coupling guards.

2.07 IDENTIFICATION OF VALVES

- A. Each valve shall be provided with a stamped metal tag secured to the valve. Tag shall indicate the valve number, the service and function of each valve. The Contractor shall furnish two sets of prints of drawings showing floor plan for each floor with all valves accurately located and labeled. Submitted drawings shall be neat and easily readable. In addition, the Contractor shall provide a valve chart, typed neatly on 8-1/2" x 11" sheets, listing the number, size, location, function, normal operating position, on each valve installed under Division 22. Valves shall be listed by system, i.e. domestic cold water, hot water, chilled water etc. Tags shall be stamped

brass 1-1/2" diameter, and secured to valves by heavy copper figure eight hooks, braided
stainless steel wire anchor, or other

approved means.

- B. Division 22 valve tags shall be coordinated with Division 21 and Division 23 valve tags for coordinated format between each Division.
- C. Valve tags shall be coordinated with existing facility valve tags and Contractor shall obtain a copy of existing facility valve chart and provide updated valve chart to the Owner's Representative.

2.08 PIPING SYSTEM IDENTIFICATION

- A. Means of Identification: All piping installed and/or modified as part of this project shall be identified by each of the means described below. The Contractor shall provide shop drawing submittal data for proposed labeling system materials and manufacturer's recommended installation procedures.
- B. Piping Systems shall be identified by means of an identifying legend on color coded background appropriately worded to indicate the "service" name of the pipe as shown on the drawings. Color coded banding shall also be provided. Additionally, an arrow shall be included to indicate the direction of flow through the pipe.
- C. Locations of Piping System Identification: The identifying legends and directional arrows described in the paragraphs preceding shall be located at the following points on each piping system:
 - 1. Adjacent to each valve in piping system.
 - 2. At every point of entry and exit where piping passes through a wall.
 - 3. On each pipe riser and junction.
 - 4. At a maximum interval of 20 feet on pipe lines exposed and concealed above accessible ceilings.
 - 5. Adjacent to all special fittings (regulating valves, etc.) in piping systems.
 - 6. At every access door.
- D. Piping identification shall meet the standards of the Federal Occupational Safety Health Act (OSHA) which refers to the ANSI Standard A13.1. The following standardized color code scheme shall be used:
 - Yellow - Hazardous Materials
 - Green - Liquid Materials of Inherently Low Hazard
 - Blue - Gaseous Materials of Inherently Low Hazard
 - Red - Fire Protection Materials

- E. The size of letter and length of color field shall conform to the ANSI standard and shall be as follows:

<u>Outside Diameter of Pipe or Covering</u>	<u>Length of Color Field</u>	<u>Size of Letters</u>
----- to 1-1/4"	8"	1/2"
1-1/2" to 2"	8"	3/4"
2-1/2" to 6"	12"	1-1/4"
8" to 10"	24"	2-1/2"
Over 10"	32"	3-1/2"

- F. All pipe labels shall be vinyl material with permanent adhesive for application to clear dry pipe and/or insulation jacketing. Each label shall have appropriate color-coded background with printed legend. Direction arrows shall be placed next to label to indicate flow direction. Color and size of arrows shall correspond to that of label. Pressure sensitive pipe tape matching the background color of the label shall be placed over each end of the label and completely around the pipe.
- G. Attach pipe markers to lower quarter of the pipe on horizontal runs and on the centerline of vertical piping where view is not obstructed. Flow indicator arrow shall point away from pipe marker.
- H. Provide the following labels, with ANSI/OSHA color for all piping systems as shown on the drawings and as listed below:

<u>Service/Legend</u>	<u>Letter Color</u>	<u>Background Color</u>
Domestic Cold Water	White	Green
Domestic Hot Water	Black	Yellow
Domestic Hot Water Return	Black	Yellow
Soft Cold Water	White	Green
Soft Hot Water	Black	Yellow
Industrial (non potable) Cold Water	White	Green
Reverse Osmosis	White	Green
Compressed Air	White	Blue
Roof Drain	White	Green
Sanitary Sewer	White	Green
Storm Sewer	White	Green

2.09 IDENTIFICATION OF CONTROL SYSTEM DEVICES

- A. All automatic controls, control panels, zone valves, pressure electric, electric pressure switches, relays and starters shall be clearly tagged and identified. Wording shall be identical to that on the control diagram in the contract drawings.

2.10 UNDERGROUND PIPING SYSTEM IDENTIFICATION

- A. Bury a continuous, preprinted, bright colored, plastic ribbon cable marker with each underground pipe regardless of whether encased. Locate directly over buried pipe, 6" to 8" below finished grade. Marker tape used in conjunction with buried plastic piping systems shall be special detector type. Marker tape used in conjunction with buried plastic piping systems shall be special detection type.

2.11 EQUIPMENT TAGS

- A. Furnish and install equipment identification tags for all items of PLUMBING equipment furnished and installed under Division 22. Equipment tags shall be a minimum of 3/32" thick laminated phenolic plastic.

2.12 ACCESS DOORS

- A. Provide all access doors required for access to valves, controls, or other items for which access is required for either operation or servicing. All costs incurred through failure to perform this function as the proper sequence of this work shall be borne by the Contractor. The type of access door shall be as required by the room finish schedule. Acoustical tile access doors shall be equal to Krueger Style B, Style A for acoustical plaster, Style C-CE for sidewall drywall or plaster construction.
- B. Access doors shall be not less than 24" x 24" in size except that larger panels shall be furnished where required, and panels in tile or other similar patterned ceilings shall have dimensions corresponding to the tile or pattern module.
- C. Where access doors are installed in walls required to have a specific fire rating, the access door installed shall be a fire rated access door with UL label, as manufactured by Milcor or equivalent. Access door in 1-hour construction shall be Class C and access doors in 2-hour construction shall be Class B.

PART 3 EXECUTION

3.01 COOPERATION WITH OTHER TRADES

- A. The Contractor shall refer to other parts of these specifications covering the work of other trades which must be carried on in conjunction with the plumbing work so that the construction

operations can proceed without harm to the Owner from interference, delay, or absence of coordination. The Contractor shall be responsible for the size and accuracy of all openings.

3.02 DRAWINGS

- A. The plumbing drawings show the general arrangement of all piping, fixtures, equipment, etc., and shall be followed as closely as actual building construction and work of other trades will permit. Whenever discrepancies occur between plans and specifications, the most stringent shall govern. All Contract Documents, including but not limited to Division 21 Fire Suppression, Division 23 HVAC, and Division 26 Electrical shall be considered as part of the work insofar as this information furnishes the Contractor with details relating to design and construction of the building. Architectural and Structural drawings shall take precedence over the plumbing, HVAC and fire suppression drawings. Install plumbing fixtures, floor drains, floor sinks, roof drains, etc. in locations as indicated on Architectural drawings. Because of the small scale of the plumbing, HVAC and fire suppression drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, valves, and accessories as may be required to meet such conditions. Should conditions necessitate a rearrangement of piping, such departures and the reasons therefore shall be submitted by the Contractor for review in the form of detailed drawings showing the proposed changes. No such changes shall be made without the prior written approval. All changes shall be marked on the set of record drawings by the Contractor.
- B. Should any doubt or question arise in respect to the true meaning of the drawings or specifications, the question shall be submitted in writing.
- C. Installation of all plumbing equipment and piping systems shall be arranged to provide all clearances required for equipment operation, service, and maintenance, including minimum clearances required by applicable codes, manufacturer's installation instructions and as necessary for proper clearance in front of all electrical panels as defined by the National Electric Code (NEC). Piping systems shall not be routed through or above electrical equipment room or electrical equipment space designed within equipment rooms.
- D. The installation of all concealed plumbing systems shall be carefully arranged to fit within the available space without interference with adjacent structural and electrical systems. The Contractor shall make all necessary provisions for penetrations of piping, including sleeves and

blockouts in structural systems. The exact location of all exposed plumbing systems; access doors; piping exposed within finished areas; and other equipment and devices as applicable, shall be coordinated with the Architect, who shall have final authority for the acceptance of the work as it specifically

relates to the architectural aesthetic design requirements for the facility.

3.03 FIELD MEASUREMENTS

- A. The Contractor shall verify the dimensions and conditions governing his work at the building. No extra compensation shall be claimed or allowed on account of differences between actual dimensions, including dimensions of equipment, fixtures and materials furnished, and those indicated on the drawings. Contractor shall examine adjoining work, on which his work is dependent for perfect efficiency, and shall report any work which must be corrected. Coordination of all plumbing work within the building will be the direct responsibility of the Contractor. Review of submittal data in accordance with paragraph "Submittals" shall in no manner relieve the Contractor of responsibility for the proper installation of the plumbing work within the available space. Installation of equipment and systems within the building space shall be carefully coordinated by the Contractor with all building trades. Each contractor shall so harmonize his work with that of the several other trades that it may be installed in the most direct and workmanlike manner without hindering or handicapping the other trades. Piping interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Sewer lines shall take precedence over water lines in determination of elevations. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork. Installation of plumbing, HVAC and fire suppression equipment within the ceiling cavity shall be in the following order of priority: plumbing waste lines; supply, return, outside air, makeup, and exhaust ductwork fire sprinkler mains; fire sprinkler branch piping and sprinkler runouts; domestic hot and cold water; control piping, wiring and conduit; miscellaneous special piping systems.

3.04 EQUIPMENT SUPPORT

- A. Contractor shall provide support for equipment to the building structure. Contractor shall furnish all necessary structures, inserts, sleeves, and hanging devices for installation of mechanical and plumbing equipment, ductwork and piping, etc. Contractor shall completely coordinate installation of such devices with all trades and Sub-Contractors. Contractor must further verify that the devices and supports are adequate as intended and do not overload the building's structural components in any way.

3.05 PROTECTION OF MATERIALS AND EQUIPMENT

- A. The Contractor shall be responsible for the protection of all work, materials and equipment furnished and installed under this section of the specifications, whether incorporated in the building or not.
- B. Plumbing equipment and materials, including piping, valves and fittings, etc., shall be protected from damage and contamination. Equipment and materials shall not be stored outside and exposed to weather and ambient conditions without appropriate protection measures and without the approval of the Architect. Equipment and materials shall be delivered to the jobsite and maintained while on the jobsite with all openings, controls and control panels covered with caps, with heavy duty polyethylene wrap or other proper means. Equipment and materials where stored within the building shall be protected at all times from construction damage and contamination from dust, dirt, debris, and especially during fireproofing, painting and gypboard sanding and finishing. Unprotected equipment and piping will require special field cleaning by the Contractor prior to acceptance by the Architect.
- C. The Contractor shall provide protection for all work where necessary and shall be responsible for all damage done to property, equipment and materials. Storage of materials within the building shall be approved by the Architect prior to such storage.
- D. Pipe openings shall be closed with caps or plugs, or covered to prevent lodgment of dirt or trash during the course of installation. At the completion of the plumbing work, fixtures and materials shall be cleaned and polished thoroughly and delivered in a condition satisfactory to the Architect.

3.06 TRENCHING AND BACKFILLING

- A. All excavation, trenching and backfilling required for the plumbing installation shall be provided by this Contractor.

3.07 MANUFACTURER'S INSTRUCTIONS

- A. All equipment shall be installed in strict accordance with recommendations of the manufacturer. If such recommendations conflict with plans and specifications, the Contractor shall report such conflicts to the Architect, who shall make such compromises as he deems necessary and desirable.

3.08 PRESSURE RELIEF DEVICES

- A. Pressure relief devices and fusible plugs shall be installed with piping to a safe location in accordance with Code requirements.

3.09 TESTS

- A. Tests shall be conducted in the presence of the designated and authorized Owner's Representative. The Contractor shall notify the Architect a minimum of one week in advance of scheduled tests. Requirements for testing are specified under the sections covering the various systems. The Contractor shall furnish all necessary equipment, materials, and labor to perform the required tests.

3.10 INSTALLATION CHECK

- A. An experienced, competent, and authorized representative of the equipment listed below shall visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The equipment supplier's representative shall revisit the job site as often as necessary until all trouble is corrected and the equipment installation and operation is approved and accepted.

3.11 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. The Contractor shall furnish complete operating and maintenance instructions covering all units of plumbing equipment fixtures, faucets, etc., herein specified together with parts lists. Equipment spare parts shall include all components requiring service, including motors, bearings, shafts, etc.
- B. See Division 1 for additional requirements concerning manuals, manual distribution, and maintenance materials.
- C. Operating and maintenance manuals as required herein shall be submitted for review and distribution to the Owner not less than two (2) weeks prior to the date scheduled for the Contractor to provide Operating and Maintenance Instructions to the Owner as specified herein.
- D. Upon completion of all work and all tests, Contractor shall furnish the necessary skilled labor and helpers for operating the plumbing systems and equipment for a period of five (5) days of eight (8) hours each. During this period, the Contractor shall instruct the Owner or his

representative fully in the operations, adjustment and maintenance of all equipment furnished. Contractor shall provide at least two weeks notice in advance of this period, with a written schedule of each training session, the subject of the session, the Contractors' representatives who plan to attend the session, and the time for each session.

- E. Film the instruction and training sessions submit two copies of the DVD.
- F. Operational test shall be conducted by the Contractor with the assistance of the equipment manufacturer's representative or service technician. Test shall be conducted in the presence of the

designated and authorized Owner's Representative.

3.12 CERTIFICATIONS

- A. Before receiving final payment, the Contractor shall certify in writing that all equipment furnished and all work done is in compliance with the contract documents and all applicable codes. Submit certifications and acceptance certificates, including proof of delivery of O&M manuals, spare parts required, and equipment warranties which shall be bound with O&M manuals.

3.13 INTERRUPTING SERVICES

- A. The Contractor shall coordinate the installation of all plumbing work onsite and within the building in order to minimize interference with the operation of existing building and onsite mechanical, plumbing, fire protection, and utility systems during construction. Connections to existing systems requiring the interruption of service within the building shall be carefully coordinated with the Owner to minimize system downtimes. Requests for the interruption of existing services shall be submitted in writing a minimum of two (2) weeks before the scheduled date. Absolutely no interruption of the existing services will be permitted without written review and authorization.

3.14 PLUMBING SYSTEM SHUTDOWN AND REACTIVATION

- A. The Contractor shall shutdown existing facility plumbing equipment and piping systems as required for installation of the project plumbing construction work. As a part of the required work, the Contractor shall drain down the existing systems and after completion of new work and pressure testing of systems, the Contractor shall refill the systems and re-establish proper system circulation, remove all air from piping system and equipment, and place system in full and proper operation.

3.15 OPERATION PRIOR TO ACCEPTANCE

- A. Operation of equipment and systems installed by the Division 22 Contractor for the benefit of the Owner prior to substantial completion will be allowed providing a written agreement between the Owner and the Contractor has established warranty and other responsibilities to the satisfaction of both parties.
- B. Operation of equipment and systems installed by the Division 22 Contractor, for the benefit of

the Contractor, except for the purposes of testing and balancing will not be permitted without a written agreement between the Owner and the Contractor establishing warranty and other responsibilities.

3.16 SITE VISITS AND OBSERVATION OF CONSTRUCTION

- A. The design professional shall make periodic visits to the project site at various stages of construction in order to observe the progress and quality of various aspects of the Contractor's work, in order to determine in general if such work is proceeding in accordance with the Contract Documents. This observation, however, shall in no way release the Contractor from his complete responsibility to supervise, direct, and control all construction work and activities. The design team has no authority over, or a responsibility to means, methods, techniques, sequences, or procedures of construction provided by the Contractor or for safety precautions and programs, or for failure by the Contractor to comply with all law, regulations, and codes.
- B. Prior to the "Final" observation visit, the attached "Final Observation Checklist" shall be completed by the Contractor. Any non-applicable items shall be marked "N/A." The completed form shall be submitted, indicating that all necessary items are complete and requesting a final observation within 10 days. The Contractor shall be notified of any uncompleted items within seven (7) days. A resubmittal of the form and a new final observation request by the Contractor is required if the form is returned and noted as incomplete.

END OF SECTION

Project: _____

Date Submitted: _____

General Contractor: _____

Date of Final Mechanical System: _____

Mechanical Contractor: _____

Observation Requested: _____

**CONTRACTOR'S MECHANICAL & PLUMBING CHECK LIST
(ALL APPLICABLE ITEMS MUST BE COMPLETED PRIOR TO FINAL OBSERVATION)**

In advance of requesting a final mechanical observation for installed mechanical systems, please check all items that have been completed. For all items not applicable to this project mark N/A.

HVAC/PIPING

- _____ 1. All plumbing fixtures are set, sealed and cleaned.
- _____ 2. All domestic pipe systems are insulated.
- _____ 3. All pipe systems are identified with specified labels and directional arrows.
- _____ 4. Floor sinks and drain grates are cleaned and debris removed.
- _____ 5. Valve tags are installed.
- _____ 6. Special equipment (water softeners, water heaters, piping systems, etc.) have been checked and put into service.
- _____ 7. Medical gas systems have been checked and certified.
- _____ 8. Special piping systems have been cleaned and pressure tested.

_____	Process Piping	_____	Nitrogen
_____	Compressed Air	_____	Vacuum
_____	Natural Gas	_____	Argon
_____	Other	_____	Medical Gas
		_____	Other
- _____ 9. Limestone chips have been installed in acid dilution sumps.
- _____ 10. Plumbing/piping connections have been completed to Owner furnished equipment and equipment furnished by other Contractors/Sub-Contractors.
- _____ 11. Exterior wall hydrants have been cleaned.
- _____ 12. Concrete collars have been installed at clean-out to grade, valve box, or other specified plumbing items.
- _____ 13. Drains and relief lines from plumbing equipment have been installed and secured in a proper manner.
- _____ 14. All plumbing equipment and areas of equipment have been cleaned and debris removed.
- _____ 15. All plumbing equipment required by the Specifications has been identified and/or numbered.

_____ 16. Domestic water systems sterilization has been completed.

_____ 17. Strainers/suction diffusers have been cleaned.

- _____ 18. Backflow preventers have been tested.
- _____ 19. Air has been vented from all systems.
- _____ 20. Ethylene glycol system has been charged with correct mixture and tested.
- _____ 21. Water systems have been cleaned (X) and pressure tested (P).

_____ Non-potable Water	_____ Domestic Hot Water
_____ Domestic Cold Water	_____ Acid Waste and Vent
_____ Sanitary Sewer & Vent	_____ Roof and Overflow Drains
_____ Other (list)	
- _____ 22. PRV's have been adjusted (water, gasses).

PLUMBING EQUIPMENT

- _____ 1. All pump shafts and couplings have been aligned.
- _____ 2. Boilers and domestic water heaters have been fired and tested.
- _____ 3. All plumbing equipment has been lubricated.
- _____ 4. Plumbing equipment has been labeled in accordance with the specifications.
- _____ 5. "HAZARDOUS AREA" signs installed where applicable.
- _____ 6. Variable frequency drives have been tested by the manufacturer's representative and certified to be in compliance with all of the specified requirements.

GENERAL ITEMS

The following specified items have been submitted:

- _____ 1. Record drawings (to be submitted prior to final payment to the Contractor).
- _____ 2. Operation and maintenance manuals.
- _____ 3. Manufacturer's representative installation check and certification submitted (see list of equipment, Section 22 0500).
- _____ 4. Test kits furnished to Owner.

_____ Flow Measuring Devices
_____ Flow Balance Valves
_____ Flow Control Devices
- _____ 5. Control schematics and sequence of operation.
- _____ 6. Plumbing equipment and lubrication, valve, charts have been provided to Owner's Representative.

END CHECKLIST

DIVISION 22 SUBSTITUTION REQUEST FORM (SRF)

TO: BRIDGERS & PAXTON CONSULTING ENGINEERS, INC.
PROJECT: _____

We hereby submit for your consideration the following product instead of the specified item for the above project:

Section: _____ Page: _____ Paragraph/Line: _____ Specified Item: _____

Proposed Substitution: _____

Attach complete product description, drawings, photographs, performance and test data, and other information necessary for evaluation. Identify specific Model Numbers, finishes, options, etc.

1. Will changes be required to building design in order to properly install proposed substitutions? YES NO

If YES, explain: _____

2. Will the undersigned pay for changes to the building design, including engineering and drawing costs, caused by requested substitutions? YES NO

3. List differences between proposed substitutions and specified item.

Specified Item	Proposed Substitution
_____	_____
_____	_____
_____	_____

4. Does substitution affect Drawing dimensions? YES NO

5. What affect does substitution have on other trades? _____

6. Does the manufacturer's warranty for proposed substitution differ from that specified? YES NO

If YES, explain: _____

7. Will substitution affect progress schedule? YES NO

If YES, explain: _____

8. Will maintenance and service parts be locally available for substitution? YES NO

If YES, explain: _____

9. Does proposed product contain asbestos in any form? YES NO

SUBMITTED BY: Firm: _____ Date: _____

Address: _____

Signature: _____ Telephone: _____

For Engineer's Use Only		
Accepted _____	Not Accepted: _____	Received too Late: _____
By: _____	Date: _____	
Remarks: _____		

LICENSE AGREEMENT FOR CADD DATABASE OR BIM MODEL

PROJECT: _____

LICENSE GRANT: Contractor is granted use of the CADD Database or BIM Model (Database/Model) for the indicated project for the specific purpose of preparing submittal documents for this Project. No other use of the Database/Model is granted. Title to the Database/Model is not transferred to the Contractor. The Database/Model may be of value to the Contractor in preparing submittals, but use of the model does not relieve the contractor of the requirement to verify measurements in the field.

COPYING RESTRICTIONS: Contractor may copy the Database/Model in whole or in part, but only for backup and archival purposes or for use by the Contractor's Subcontractors. Contractor agrees to ensure that any entities that receive the Database/Model from Contractor, either in whole or in part, comply with the terms and conditions of this agreement. Contractor shall safeguard the Database/Model from falling into the hands of parties other than Subcontractors with a legitimate need for it.

WARRANTY: Bridgers & Paxton (B&P) offers this Database/Model without warranty and specifically without express or implied warranty of fitness. If Contractor chooses to use the Database/Model, then he does so at his own risk and without any liability or risk to B&P.

INDEMNITY: Contractor shall to the fullest extent permitted by law, defend, indemnify and hold harmless the Owner, Architect, B&P, their employees and agents from all claims, damages, losses, and attorney fees arising out of or resulting from the use of the Database/Model.

ACKNOWLEDGMENT: Contractor acknowledges that (s)he has read this Agreement, understands it, and agrees to be bound by its terms and conditions.

CONTRACTOR'S REPRESENTATIVE

Signature: _____ Company Name: _____

Name: _____ Address 1: _____

Title: _____ Address 2: _____

Date: _____