Appendix A. Technical Specifications

# Kitchen Renovation For

# CITY OF AZTEC

# Senior Center

BID # 2023-818

Proj.No. 220301

STATE OF NEW MEXICO
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**SECTION 00 0002**

**INDEX OF SECTIONS**
**CITY OF AZTEC**
**SENIOR CITIZEN CENTER KITCHEN**

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**END OF SECTION**

SECTION 01 0400

COORDINATION

PART 1 GENERAL

1.1 DESCRIPTION

A. The General Contractor shall coordinate the Work of all trades and all subcontractors on the job. It shall be his responsibility to see that all aspects of the Work and the interrelationship of all work be fully understood by all persons performing any part of the Work. No additional cost shall accrue to the Owner as a result of any lack of such coordination of understanding.

1.2 UTILITIES

A. The extent and type of existing underground utilities are shown on the drawings for reference only. Exact records of locations, size, type, depth, and destination of any utility on the property are not available. Contractor shall proceed with extreme caution in performance of all site work in anticipation of utilities not known or indicated.

B. During the construction period the Owner, City of Aztec, will be upgrading the electrical service to the building. This will be work done under a separate contract. During this time the power to the entire building may be off for up to twenty (20) days.

During this time the General Contractor will be required to provide their own means of power, such as portable generators to continue their work. Further coordination for this outage will be discussed at the weekly construction meetings.

1.3 DRAWINGS

A. Should on-site conditions necessitate changes in dimensions or materials or the rearrangement of piping, fixtures, and electrical equipment, such departures and the reasons therefore shall be submitted to the Architect for approval in the form of detail drawings on which all changes are marked which shall subsequently be indicated in the General Contractors preparation of “Record” drawings.

END OF SECTION

SECTION 01 1000

ADMINISTRATIVE PROVISIONS

## PART 1 GENERAL

### 1.1 WORK UNDER THIS CONTRACT

A. Work under this contract includes all material, labor, tools, expendable equipment, utility and transportation services and all incidental items necessary to perform and complete in a workmanlike manner, the Work required for the:

1. Demolition of the existing service area walls and door. All equipment in this area will be removed by the Owner and stored for future use.
2. Demolition of finishes in the existing kitchen area to include ceiling, flooring and lighting. All equipment in this area will be removed by the Owner and stored for future use.
3. Demolition of existing dishwash room including walls, flooring and ceiling. The Contractor will remove the piped equipment including the three (3) bay sink, dishwasher and dis tables. Salvage for reinstallation.
4. Reconfigure this area with new walls per the floor plan.
5. Remove only as much of the existing ceiling system in the multi-purpose room as necessary. Ceiling systems and flooring/base will be replaced to match.
6. Existing water piping systems and HVAC ductwork will be extended into the new areas. Remove ceilings in adjacent areas as needed for this work. Replace to match.

### 1.2 SCOPE

A. Each Division or Section of the Specification shall be deemed to have as its leading Paragraph the following, which shall become part of each Section or Division as if written out in full:

1. Scope of Work: Contractor performing this Work shall furnish all labor, equipment, tools, appurtenances, and materials, except those specified to be furnished by others, and pay for all special taxes or permits necessary to complete all work as hereinafter required or as shown or called for on the Drawings.
2. Manufacturer's Printed Directions: Where these Specifications require that a material, article, or apparatus shall be applied, installed, connected, erected, cleaned, and conditioned, "In accordance with the Manufacturer's printed specifications, directions, or recommendations", they shall have the same force and effect as though written in full in these Specifications.

### 1.3 CONTRACTS

A. The project shall be constructed under a single lump sum contract.

### 1.4 WORK BY OTHERS

A. Phone, data, security devices and wiring.

B. Electrical service upgrades to be done by the Owner under a separate contract. See Specification Section 01 0400.

1.5 PROJECT SCHEDULING

A. In order to minimize the length of time the building will be out of service to the Owner the General Contractor will meet with the Architect and the Owner's Representative to review the proposed construction scheduling.

Work shall not proceed until materials for the work are onsite, readily available or confirmed delivery dates are known. This schedule will be approved by all parties before work shall commence.

1.6 CONTRACTOR'S USE OF PREMISES:

A. Contractor shall have limited use and access to site.

B. Do not unreasonably encumber site with materials or equipment.

C. Assume full responsibility for protection and safe-keeping of products stored on premises.

D. Move any stored products which interfere with operations of Owner or other Contractors.

E. Obtain and pay for use of additional storage or work areas needed for operations.

F. Limit use of site for work and storage.

1.7 COORDINATION

A. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later in the construction process.

B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting and placing in service such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repair.

D. In finished areas (except as otherwise shown), conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

1.8 FIELD ENGINEERING

A. Each trade shall lay out his work so as to interfere as little as possible with location of work of other trades. Obvious conflicts shall be brought to the attention of the Architect.

B. Shoring, Anchoring and Bracing: The Contractor shall provide temporary shoring, anchoring and bracing required by the nature of the Work in order to make all parts absolutely rigid and stable. The Contractor shall be responsible for any damage resulting from failure to provide if either through lack of proper judgment or from any other cause.

1.9 PROTECTION (ALL RESPONSIBILITY OF GENERAL CONTRACTOR).

A. Protect at all times the excavation trenches and/or the adjacent buildings from damage or rain water, spring water, ground water backing up from drains or sewers, and all other water. Provide all pumps and equipment and enclosures to insure this protection.

B. Provide all shoring, bracing, and sheeting as required for safety and prosecution of the Work, and have same removed when Work is completed.

C. Provide and maintain guard lights to all barricades, railings, obstructions in the streets, roads, or sidewalks, and at all trenches or pits adjacent to public ways, corridors, stairs, or hallways.

D. Provide at all times protection against weather (rain, wind, storms, frost, or heat) so as to maintain all work, materials, apparatus and fixtures free from injury or damage. At the end of a day's work all new Work likely to be damaged shall be covered.

E. The Contractor shall provide a temporary dust barrier to keep dust and debris from spreading throughout the entire building. The barrier wall may be attached to stud framing with plastic sheeting or other approved means. The barrier should extend from the floor to the lay-in ceiling system or structure.

1.10 REFERENCE STANDARDS

A. For products specified by association or trade standards, comply with requirements of the standard, except when more field requirements are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the Bid date, or date of Owner-Contractor Agreement when there are no bids, except when a specific date is specified.

C. Obtain copies of standards when required by Contract Documents. Maintain copy at jobsite during progress of the specific work.

1.11 WORK IN PUBLIC RIGHT OF WAY

A. General Contractor shall pay all fees and for all damages to sidewalks, streets, or other public utilities, which result from execution of this Contract.

1.12 GUARANTEE

A. The Contractor shall warrant and guarantee all workmanship performed by him and materials supplied by him for a period of one (1) year from date of completion, as evidenced by date of Beneficial Occupancy or Substantial Completion on this Contract. All guarantees for this period, or for a longer period of time required by Sections of these Specifications, shall be secured from separate subcontractors and delivered to the Architect and shall be warranted by General Contractor.

END OF SECTION

SECTION 01 1520

APPLICATION FOR PAYMENT

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Submit Applications for Payment to Architect/Engineer in accordance with the schedule established by Conditions of the Contract and Agreement Between Owner and Contractor.

1.2 RELATED REQUIREMENTS

A. Agreement between Owner and Contractor: Lump Sum and Unit Prices.

B. Conditions of the Contract: Progress Payments, Retainages and Final Payment.

C. Section 01 7010: Contract Closeout.

1.3 FORMAT AND DATA REQUIRED

A. Submit itemized applications typed on AIA Document G702, Application and Certificate for Payment, and continuation sheets G703.

1.4 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
2. Fill in summary of dollar values to agree with respective total indicated on continuation sheets.
3. Execute certification with signature of a responsible officer of Contract firm.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.
2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.

   ROUND OFF VALUES TO THE NEAREST DOLLAR.

3. List each Change Order executed prior to date of submission, at the end of the continuation sheets.

   a. List by Change Order number, and description, as for an original component item of Work.

C. Project Schedule

1. With each application for payment, Contractor shall include an updated project schedule. The Pay Request will NOT be forwarded to the Owner without the schedule.

D. Project Narrative:

1. With each application for payment, contractor shall include a project narrative describing the activity completed, any special problems, delays or other items that could influence the projects schedule and completion.

1.5 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Architect/Engineer requires substantiating data, contractor shall submit suitable information with a cover letter identifying:

1. Project.
2. Application number and date.
3. Detailed list of enclosures.
4. For stored products:

a. Item number and identification as shown on application.
b. Description of specific material.
c. Indicate location of stored materials; if not on project site, approval for payment of these stored items will be at the discretion of the Owner or the Architect/Engineer.

B. Submit one copy of data for each copy of application.

1.6 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified for progress payments.

B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01 7010 - Contract Closeout.

1.7 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to Architect/Engineer by the 25th of each month.

B. Number: Three copies of each Application.

C. When Architect/Engineer finds Application properly completed and correct, he will transmit certificate for payment to Owner, with copy to Contractor.

D. **ARCHITECT WILL NOT CERTIFY PAY REQUEST UNTIL HE VERIFIES THAT "AS-BUILT" DRAWINGS ARE CURRENT AND UP TO-DATE. IF AS BUILT'S ARE NOT CURRENT - PAY REQUEST WILL BE HELD UNTIL THEY ARE BROUGHT UP TO-DATE.**

END OF SECTION

SECTION 01 3100

CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Within ten days after award of the Contract, prepare and submit to Architect/Engineer estimated construction progress schedules for the Work, with sub-schedules of related activities which are essential to its progress.

B. Submit revised progress schedules with each Certificate of Payment Request.

C. At weekly project meetings, Contractor shall submit completed Projected Two- Week Schedule. This project should show in bar chart form all work scheduled for the next 14 days.

1.2 RELATED REQUIREMENTS

A. General Conditions of the Contract.

B. Section 01 1000: Administrative Provisions.

C. Section 01 3400: Shop Drawings, Product Data and Samples

1.3 FORM OF SCHEDULES

A. Provide separate horizontal bar for each trade of operation.

1. Horizontal time scale: Identify the first work day of each week.
2. Scale and spacing: To allow space for notations and future revisions.
3. Minimum sheet size: 11 inches by 17 inches.

B. Format of listings: The table of contents of this Project Manual.

C. Identifications of listings: By major specification section numbers.

1.4 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity according to the Index of Specifications.

1.5 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:

1. Major changes in scope.
2. Activities modified since previous submission.
3. Revised projections of progress and completion.
4. Other identifiable changes.

C. Provide a narrative report as needed to define:

1. Problem areas, anticipated delays, and the impact on the schedule.
2. Corrective action recommended, and its effect.
3. Effect of changes on schedules of other prime contractors.

1.6 SUBMISSIONS

A. Submit initial schedules within 10 days after award of contract.

1. Architect/Engineer will review schedules and return review copy within 5 days after receipt.
2. If required, resubmit within 7 days after return of review copy.

B. Submit the number of opaque reproductions which the Contractor requires, plus two copies which will be retained by the Architect/Engineer.

1.7 DISTRIBUTION

A. Distribute copies of the reviewed schedules to:

1. Job site file.
2. Subcontractors.
3. Other concerned parties.

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 3200

PROJECT MEETINGS

PART 1 GENERAL

1.1 PRECONSTRUCTION CONFERENCE

A. THE GENERAL CONTRACTOR, THE MECHANICAL, ELECTRICAL SUBCONTRACTORS AND OTHER MAJOR SUBCONTRACTORS, shall attend a preconstruction conference to discuss and clarify contract administration procedures, and Construction Schedule and requirements under which the construction operation is to proceed. The Owner and the Architects-Engineers will also attend. The Architect will notify the General Contractor of the date, time, and location of the conference.

1.2 CONSTRUCTION SCHEDULE

A. THE GENERAL CONTRACTOR shall prepare a preliminary critical path method (CPM) construction schedule for explanation and discussion at this meeting.

1.3 CONSTRUCTION MEETINGS

A. WEEKLY JOBSITE MEETINGS will be held by the Contractor to insure that all activities are being coordinated properly on the project and to assist in meeting the schedule. The status of submittals, change orders, and other matters will be reviewed. The Architect shall attend such meetings as shall all Subcontractors currently involved with Work as well as those who will be involved in the Work within two weeks. The General Contractor shall be prepared to present a Two week “Look Ahead” schedule at these meetings to discuss any delivery, coordination or scheduling concerns that may arise.

B. CONTRACTORS shall attend personally, or be represented at such meetings. Should the contractor elect to be represented it shall be understood and agreed that the Owner and the Architect-Engineer, in dealing with the Contractor's representative, do so with full assurance that the representative's actions and commitments may be accepted the same as though the Contractor who signed, and is bound by the Contract were himself present and personally made such agreements or commitments. General Contractor will advise all concerned of the schedule of meetings. Contractor to provide copies of detailed Projected Two-Week Schedule for each trade for the upcoming two weeks.

C. ~~The General Contractor shall provide an adequate supply of coffee and donuts at all weekly progress meetings for all those attending.~~ (Omitted 11/15/22, Addendum #1.)

**D. ALL CELL PHONES MUST BE TURNED OFF DURING THE MEETING.**

END OF SECTION

SECTION 01 3400

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Submit to the architect/engineer shop drawings, product data and sample required by specification sections.

B. CONTRACTOR NOTICE: ALL SUBMITTALS ARE REQUIRED TO BE IN HAND OF THE ARCHITECT OR ENGINEER WITHIN FORTY-FIVE DAYS (45) OF AWARD OF CONTRACT.

1.2 RELATED REQUIREMENTS

A. Conditions of the Contract: Definitions, and Additional Responsibilities of Parties.

B. Section 01 3100: Construction Schedules

C. Section 01 7200: Record Documents

D. Designate in the construction schedule, or in a separate coordinated schedule, the dates for submission and the dates that reviewed Shop Drawings, Product Data and Samples will be needed.

1.3 SHOP DRAWINGS: Original drawings, prepared by contractor, subcontractor, supplier or distributor, which illustrate some portion of the work, showing fabrication, layout, setting, or erection details.

A. Prepared by a qualified detailer.

B. Identify details by reference to sheet and detail numbers shown on contract drawings.

C. Minimum sheet size: 8-1/2" x 11".

D. Maximum sheet size: 24" x 36".

E. Submit two (2) paper copies of each product as well as an electronic version to Rodahl and Hummell Architecture email.

1.4 PRODUCT DATA:

A. Manufacturer's standard schematic drawings:

1. Modify drawings to delete information which is not applicable to project.
2. Supplement standard information to provide additional information applicable to project.

B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.

1. Clearly mark each copy to identify pertinent materials, products or models.

2. Show dimensions and clearance required.
3. Show performance characteristics and capacities.
4. Show wiring diagrams and controls.

1.5 SUBMISSION REQUIREMENTS:

A. CONTRACTOR SHALL REVIEW ALL SUBMITTALS, SHOP DRAWINGS, AND PRODUCT DATA PRIOR TO SUBMITTING THEM TO ARCHITECT/ENGINEER AND ALL SUBMITTALS, ETC. SHALL BEAR A STAMP SO INDICATING CONTRACTOR REVIEW. ARCHITECT/ENGINEER SHALL RETURN TO CONTRACTOR ANY SUBMITTAL THAT HAS NOT BEEN REVIEWED AND APPROVED BY CONTRACTOR. NO EXCEPTIONS WILL BE PERMITTED TO THE ABOVE REQUIREMENT.

B. CONTRACTOR SHALL SUBMIT MECHANICAL AND ELECTRICAL DIRECTLY TO THE RESPECTIVE CONSULTANTS (SEE TITLE SHEET OF DRAWINGS) WITH TRANSMITTAL LETTER TO ARCHITECT SHOWING WHEN SUBMITTALS WERE SENT.

C. Submit number of copies or prints of shop drawings and number of copies of product data (including materials for color selection) which contractor requires for distribution plus two (2) copies which will be retained by architect/engineer.

D. Submit samples specified in each of the specification sections.

E. Accompany submittals with transmittal letter, containing:

1. Date
2. Project title and number
3. Contractor's name and address
4. The number of each shop drawing, project data and sample submitted
5. Notification of deviations from contract documents
6. Other pertinent data.

F. Submittals shall be complete for trade involved and shall be submitted at one time, and shall include:

1. Date and revision dates
2. Project title and number
3. The names of:

    a. Architect/Engineer
    b. Contractor
    c. Subcontractor
    d. Supplier
    e. Manufacturer
    f. Separate detailer when pertinent

4. Identification of product or material
5. Relation to adjacent structure or materials
6. Field dimensions, clearly identified as such where required. Further review by the Architect will not happen, if these field dimensions are not indicated.
7. Specification section number
8. Applicable standard, such as ASTM number or federal specifications

9. A blank space, 4" x 4", located in lower right hand corner for the architect/engineer's stamp
10. Identification of deviations from contract documents
11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with contract documents.

G. All finish material which require color selection and are not previously selected in these specifications shall be submitted as soon as possible. Color selections will not be until all items are submitted and colors can be coordinated. A Color Schedule will be prepared following this selection and distributed to the General Contractor.

1.6 RESUBMISSION REQUIREMENTS

A. Shop drawings:

1. Revise initial drawings as required and resubmit as specified for initial submittal.

2. Indicate on drawings any changes which have been made other than those requested by architect/engineer.

B. Product data and samples: Submit new data and samples as required for initial submittal.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 5000

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.

B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.

1.2 TEMPORARY ELECTRICITY

A. Provide temporary electric feeder from electrical service at location as directed.

B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required in each area. Provide flexible grounded power cords as required.

C. Permanent convenience receptacles may not be utilized during construction.

1.3 TEMPORARY LIGHTING

A. Temporary lighting shall be provided during the construction period by the General Contractor for use by all trades, Contractors, and Subcontractors for safe and adequate working conditions throughout the building and stairways, and shall provide minimum illumination measured in foot candles (FC) at the floor line, as follows:

| | |
|---|---|
| General area and walkway lighting | 5 FC |
| Boiler, mechanical, and electrical rooms | 20 FC |
| General, electrical, and mechanical rough work areas | 10 FC |
| Concrete, masonry, and finish work areas | 20 FC |

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

D. Permanent building lighting may not be utilized during construction.

1.4 TEMPORARY HEAT

A. Provide and pay for heat devices and heat as required to maintain specified conditions for construction operations.

B. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

C. Maintain minimum ambient temperature of 50 degrees F (in areas where construction is in progress, unless indicated otherwise in specifications.)

D. Existing ductwork within the construction area may be used for heating. Return air ducts shall have a filter installed prior to use. The Contractor will be responsible to change the filter in the rooftop mounted unit(s) service these areas when construction is complete.

1.5 TEMPORARY VENTILATION

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

1.6 TEMPORARY WATER SERVICE

A. On-site water supplies may be utilized for construction.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections.

1.7 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures adequate for the work force on the project at a ratio of one portable restroom per ten workers.

1.8 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

C. Interior dust barriers shall be temporarily erected in accordance with Specification Section 01 1000, 1.9, E. Self-closing door may be installed within the barrier wall as needed. Coordinate location with Owner.

1.9 EXTERIOR ENCLOSURES

A. Provide temporary weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.10 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

1.11 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition on a daily basis. Should the site become unsafe and hazardous due to debris and rubbish the job will be shut down until it is cleaned up.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Remove waste materials, debris, and rubbish from site weekly and dispose off-site.

END OF SECTION

SECTION 01 6300

PRODUCTS AND SUBSTITUTIONS

PART 1 GENERAL

1.1 DESCRIPTION

A. Product quality, substitutions, transportation, storage, protection and installations shall conform to the following general requirements unless otherwise described under a specific section of these specifications.

1.2 QUALITY:

A. Specifications:

1. The intent of these specifications is to allow ample opportunity for the contractor to use his ingenuity and abilities to prosecute the work to his and the Owner's best advantage, and to permit maximum competition in bidding on standards of material and equipment required.
2. In general, these specifications identify the required materials and equipment by naming one or more manufacturer's brand, model, catalog number and/or other identification; the first named manufacturer's product used as the basis for design; other named brands considered equivalent. Equivalent brands or manufacturer's named, must furnish products consistent with the specifications for the first named product, as determined by the architect/engineer. Base bid shall include only those brands named.
3. NO SUBSTITUTIONS: THERE ARE SEVERAL PRODUCTS SPECIFIED, FOR WHICH NO SUBSTITUTION IS ALLOWED. SEE RESPECTIVE SECTIONS WHERE THIS RESTRICTION IS IN EFFECT.

B. Prior Approvals

1. SHOULD THE CONTRACTOR DESIRE TO BID SUBSTITUTE EQUIPMENT OTHER THAN THAT SPECIFIED, HE MUST PROVIDE SUBMITTAL DATA TO THE ARCHITECT/ENGINEER AT LEAST SEVEN DAYS PRIOR TO THE BID DATE. IF AFTER EXAMINING THE DATA, THE ARCHITECT/ENGINEER DETERMINES THIS ALTERNATE EQUIPMENT IS ACCEPTABLE, AN ADDENDA WILL BE ISSUED TO ALL BIDDERS PERMITTING THEM TO BID THIS EQUIPMENT.
2. **NOTE: PRIOR APPROVAL WILL NOT BE ACCEPTED VIA FAX.**
3. CONTRACTOR, SUBCONTRACTORS, AND SUPPLIERS: DON'T EVEN THINK ABOUT REQUESTING SUBSTITUTIONS AFTER THE CONTRACT IS AWARDED EXCEPT IN ACCORDANCE WITH PARAGRAPH 1.3 OF THIS SECTION.
4. Where materials or equipment are described but not named, provide required first-quality items, adequate in every respect for the intended use; such items subject to architect/engineer's approval or prior to procurement, unless otherwise agreed in writing.
5. In specifying an item by manufacturer's name and/or catalog number, unless specifically stated otherwise, such item shall be provided with all standard devices and accessories indicated in the latest edition of the manufacturer's catalog or brochure; such item further complete with component parts necessary for the obviously intended used and installation, whether or not the description or catalog number contains all supplemental information and/or numbers of such components.

C. Engineer's selection and approval of products:

1. Where approval of architect/engineer for products is required, secure such approval before procurement.
2. Where colors and/or patterns are to be selected by architect/engineer, request such selection in ample time for procurement. Provide color charts, samples, etc., with request.
3. The aesthetic values of every material and installation, such as shape, proportion, texture, finish, and color, will be an important consideration to the architect/engineer and his decisions cover same shall be final.

D. Performance:

1. Where drawings and/or specifications designate a standard of performance e.g. fire ratings, sound transmission class, insulation value, heating output, air velocity, etc. the completed installation shall perform at least to the designated standard.

E. Appropriate materials and installations:

1. The contractor, his subcontractors and material suppliers observe drawings and specifications, and should any material and/or its installation be indicated or specified in a manner not approved by material manufacturer, notify the architect/engineer and receive his instructions. Failing to do so, contractor shall provide other equivalent materials, suitable for the installation, as approved by the architect/engineer, at no added cost to the Owner.

1.3 SUBSTITUTIONS AFTER BID OPENING: (NOTE: THIS SECTION APPLIES ONLY IF SPECIFIED PRODUCTS ARE NOT AVAILABLE ON A TIMELY BASIS)

A. Request for substitutions:

1. Architect/engineer will consider formal request from contractor for substitutions of products in place of those specified.
2. Submit written request for substitution. Include in the request:

a. Complete data substantiating compliance of proposed substitution with contract documents.
b. Accurate cost data on proposed substitutions specified.

3. In making his request for substitution, bidder/contractor shall comply with requirements of 1.2,B,2.

a. HE HAS PERSONALLY INVESTIGATED PROPOSED PRODUCT OR METHOD, AND DETERMINED THAT IT IS EQUAL OR SUPERIOR IN ALL RESPECTS TO THAT SPECIFIED.
b. He will provide the same guarantee for substitution as for product of method specified.
c. He will coordinate installation of accepted substitution into work, making such changes as may be required for work to be complete in all respects.
d. He waives all claims for additional costs related to substitution which consequently becomes apparent.
e. Cost data is complete and includes all related costs under this contract, but excludes:

1) Costs under separate contracts
2) Engineer's redesign

4. Substitutions will not be considered if:

a. They are indicated or implied on shop drawings or project data submittals without formal request submitted in accordance with paragraph 1.3 A.2 above.
b. Acceptance will require substantial revision of contract documents.

a. The contractor or sub-contractor have failed to place the order for the material in a timely manner and now want to substitute a material more readily available.

1.4 PRODUCT HANDLING AND STORAGE

A. Packaging and identification:

1. Deliver materials in manufacturer's original, unbroken containers with labels intact and legible, clearly identifying manufacturer, contents, brand name, color, pattern, and applicable standards.
2. Provide pallets, crates, cardboard packing or other containers, separators, sanding, spreaders, and paper wrappings as required by manufacturer to adequately protect items.
3. Properly tag or identify all fabricated items as scheduled on approved shop drawings or erection drawings on schedules.
4. Packages showing indications of damage that affect condition of contents are not acceptable.

B. Delivery and handling:

1. Exercise care to prevent damage to materials.
2. Operate material handling equipment so as not to damage existing construction or materials being handled.
3. On receipt of materials, check for in-transit and/or concealed damage in ample time to replace any damaged materials prior to scheduled installation time.
4. Comply with special handling requirements of manufacturer.
5. Immediately upon discovery, remove damaged or contaminated materials from site.

C. Storage

1. Material or equipment too large to store inside shall be stored above round on pallets, platforms, skids, or other supports, and adequately protected from weather, condensation, and moisture.
2. Unless otherwise noted, all other materials shall be stored above ground in a weather-tight, well ventilated, dry enclosure, until ready for use in the work.
3. Adequately protect stored items subject to damage by freezing and frost.
4. Store packaged materials in original, unbroken packages or containers with labels intact and legible.

1.5 PRODUCT INSTALLATIONS:

A. Preparation:

1. Properly prepare all work to receive subsequent work or finish. Notify architect/engineer if any work is unsatisfactory to receive such subsequent work or finish and receive his instructions before proceeding.
2. Installation or application of subsequent work implies acceptance of prior work by the subsequent installer or applicator and acknowledges his responsibility to correct prior work at his expense.

B. Installations:

1. Furnish, apply, install, connect, erect, clean, and condition manufactured articles, materials, and equipment per manufacturer's latest printed instructions and recommendations. Manufacturer's printed directions shall be on job prior to and during installation of materials and equipment.
2. Provide all attachment devices and materials necessary to secure materials together or to other materials and to secure work of other trades.
3. Make allowance for ample expansion and contraction for all building components subject to same.
4. Each trade shall build in sleeves, anchors, recesses, and openings in their work as required to receive work of other trades. Trades requiring same shall furnish sleeves, anchors, etc., of proper size and verify locations. Failure to provide proper items and instructions for installation by trade requiring their installation will acknowledge that trade's responsibility for cutting and patching.
5. Make field check of actual building dimension before fabricating products.
6. Where proper fit of work depends upon close tolerances of manufactured products, furnish necessary templates to insure proper fit of all components.
7. Install materials only when conditions of temperature, moisture, humidity, and conditions of adjacent building components are conducive to achieving best installation results.
8. In job-assembling, each trade properly cut and fit to make its assemblies fit accurately and as necessary for other trades having work occurring therein. Correct errors in cutting, shop fabrication and installation. Where necessary to cut into other building components, do so only in a manner not to damage building structurally nor aesthetically, then repair adjoining parts thoroughly and neatly. Scribe and/or otherwise neatly fit materials to adjoining materials.
9. Erect, install and secure building components in a structurally sound and appropriate manner, plumb, level, square and true-in-line. Where necessary, temporarily brace, shore, or otherwise support members until final connection or installation. Leave temporary bracing, shoring, or other structural supports in place as long as necessary for safety and until structure is strong enough to withstand all loads involved.
10. Where obviously of best practice, furnish materials in longest practical lengths and largest practical sizes to avoid unnecessary jointing. Short, make-up pieces shall not occur at end of run.
11. Miter trim corners and joints, making tight and secure.
12. Provide quality of workmanship not less than the commercially accepted standards of that trade.
13. Consult architect/engineer for mounting weight or position of any unit not specifically located.

C. Closing-in Work:

1. Contractor shall notify subcontractors, Owner and all contractors under the Owner when he is ready for them to install their portions of work and see that they comply within any reasonable period of time. Neither enclosure nor cover any piping, wiring, ducts, equipment or other items until proper tests and inspection have been made by architect/engineer and/or proper authorities.

Notify architect/engineer to inspect any work when placing of subsequent work would prevent observation of previous work.

D. Finishing:

1. Adjust windows, doors, drawers, hardware, appliances, motors, valves, controls, and other equipment for proper operation.
2. Seal exterior joints between materials to form a waterproofed enclosure.
3. Touch up imperfections in surfaces, paint and other finishes after all contractors and tradesmen have completed their work.
4. Clean surfaces using appropriate materials and methods that will thoroughly clean but no damage materials and their finishes, nor adversely affect other finishes.

E. Unless architect/engineer grants permission to repair any defective work, remove defective work from project and replace with new work in accordance with contract documents. Permission to repair any such work shall not constitute a waiver of architect/engineer's right to require complete replacement of defective work if repair operation does not restore quality and appearance of member or surface to architect/engineer's satisfaction. If permission is granted, repair according to architect/engineer's directions.

F. Submit requests on the following form.

SUBSTITUTION REQUEST FORM

**NOTE: PRIOR APPROVALS WILL NOT BE ACCEPTED VIA FAX**

TO: Rodahl & Hummell Architecture, P.C.
609 N. Dustin
Farmington, NM 87401

PROJECT: FEUS GENERATOR SHOP

We hereby submit for your consideration the following product instead of the specified item for the above referenced 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.

A. Will changes be required to building design in order to properly install proposed substitution?
Yes_____ No_____. If Yes, explain.

_____

_____

B. Will the undersigned pay for changes to the building design, including engineering and drawing costs, caused by requested substitutions?
Yes_____ No_____.

C. List differences between proposed substitution and specified item.

| Specified Item | Proposed Substitution |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

D. Does the substitution affect Drawing dimensions?
Yes_____ No_____

E. What affect does substitution have on other trades?
_____

_____

F. Does manufacturer's warranty of proposed substitution differ from that specified?
Yes_____ No_____. If Yes, explain.
_____

_____

G. Will substitution affect progress schedule?
Yes_____ No_____
If Yes, explain.
_____

_____

H. Will substitution require more license fees or royalties than specified product?
Yes_____ No_____.
_____

I. Will maintenance and service parts be locally available for substitution?
Yes_____ No_____
_____

Submitted by:

_____
Signature

_____
Firm

_____
Address

_____

_____
Date

_____
Telephone Number

**For Architect's Use Only**

_____ Accepted _____ Accepted as noted

_____ Not Accepted _____ Received too late

By:_____

Date:_____

Remarks:_____

_____

_____

_____

_____

END OF SECTION

SECTION 01 7010

CONTRACT CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Substantial Completion.

B. Final Completion.

C. Reinspection Fees.

D. Closeout Submittals.

E. Adjustment of Accounts.

F. Application for Final Payment.

1.2 RELATED REQUIREMENTS

A. Condition of the Contract: Fiscal provisions, legal submittals and additional administrative requirements.

B. Section 01 1000: Administrative Provisions.

C. Respective Sections of Specifications: Closeout submittals for work of the section.

1.3 SUBSTANTIAL COMPLETION

A. **WHEN CONTRACTOR CONSIDERS THE WORK, OR DESIGNATED PORTION THEREOF, IS SUBSTANTIALLY COMPLETE, SUBMIT WRITTEN NOTICE, WITH A PUNCH LIST OF ITEMS TO BE COMPLETED OR CORRECTED AND WHEN THEY ARE EXPECTED TO BE COMPLETED. ARCHITECT/ENGINEER PUNCH LIST WILL NOT BE SCHEDULED UNTIL THIS IS SUBMITTED.**

B. Within a reasonable time, Architect/Engineer will inspect to determine status of completion.

C. Should Architect/Engineer determine that Work is not substantially complete, he will promptly notify Contractor in writing, giving the reasons therefor.

D. Contractor shall remedy deficiencies, and send a second written notice of substantial completion, and Architect/Engineer will reinspect the Work.

E. When Architect/Engineer determines that Work is substantially complete, he will prepare a Certificate of Substantial Completion in accordance with General Conditions.

1.4 FINAL COMPLETION

A. When Contractor considers Work is complete, he shall submit written certification that:

1. Contract Documents have been reviewed.
2. Work has been inspected for compliance with Contract Documents.

3. Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
4. Equipment and systems have been tested in presence of Owner's representative and are operational.
5. Work is complete and ready for final inspection.

B. Architect/Engineer will inspect to verify status of completion with reasonable promptness.

C. Should Architect/Engineer consider that Work is incomplete or defective, he will promptly notify Contractor in writing, listing incomplete or defective work.

D. Contractor shall take immediate steps to remedy deficiencies and send a second written certification that Work is complete, and Architect/Engineer will reinspect the Work.

E. CONTRACTOR IS ALERTED THAT ANY ADDITIONAL INSPECTIONS OTHER THAN THAT OF PARAGRAPH 1.4 C AND 1.4 D WILL BE SUBJECT TO REINSPECTION FEES. SEE PARAGRAPH 1.5 A.

F. When Architect/Engineer finds Work is acceptable, he will consider closeout submittals.

G. Contractor shall have fifteen (15) days to complete all punch list items documented at the time of Substantial Completion. If these are item which cannot be completed in this time the General Contractor shall submit a written notice to the Architect stating the reasons why.

1.5 REINSPECTION FEES

A. Should Architect/Engineer perform reinspections due to failure of work to comply with claims made by the Contractor, Owner will compensate Architect/Engineer for such compensation from final payment of the Contract.

1.6 CLOSEOUT SUBMITTALS

A. **All closeout documents must be received within thirty days (30) of Substantial Completion. If not received within thirty days (30), there will be a one hundred dollar ($100.00) per day penalty.**

B. Evidence of compliance with requirements of governing authorities:

1. Certificate of Occupancy.
2. Certificates of Inspection from regulatory agencies as required by Paragraph 13.5 of the General Conditions.
3. Contractor's Affidavit of Payment of Debts and Claims
   Consent of Surety Company to Final Payment
   Contractor's and Subcontractor’s Affidavit of Release of Lien

C. Warranties and Bonds

1. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
2. Special Warranties are written warranties required by or incorporated in Contract Documents, to extend time limits provided by standard warranties or to provide greater rights for the Owner.

a. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
b. Requirements for warranties for products and installations that are specified to be warranted are included in the individual Sections of Divisions 2 through 16.

D. Operation and Maintenance Data

1. Provide data for:

a. Mechanical equipment and controls - Division 15.
b. Electrical equipment and controls - Division 16.

2. Submit two sets prior to final inspection, with a separate volume for each system, bound in 8-1/2 x 11 inch three-ring side binders with durable plastic covers. Provide a table of contents and index tabs for each volume.
3. Subdivide each into two sections as follows:

Part 1: Directory, listing names, addresses, and telephone numbers of Architect and Contractor.

Part 2: Operation and maintenance instructions, arranged by Specification Division. For each Specification Division, give names, addresses, and telephone numbers or subcontractors and suppliers.

List the following:

- Appropriate design criteria
- List of equipment
- Parts List
- Operating Instructions
- Maintenance instructions, equipment
- Maintenance instructions, finishes
- Shop drawings and product data
- Warranties

E. Deliver Project Records Drawings and Specifications to the Architect-Engineer before final payment in accord with Paragraph 3.11 of the General Conditions. All underground utilities outside of building shall be dimensioned with elevations shown. All modifications to the Drawings shall be indicated, including Architect's Supplemental Instructions and Change Orders. All information shall be transferred to a clean set of Drawings.

F. Submit Affidavit to the Architect-Engineer certifying that no asbestos was used in the manufacture and fabrication of products and materials used in the construction of this project.

G. Certificates of Insurance for Products and Completed Operations: In accordance with Supplementary Conditions.

1.7 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: Two (2) each.

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product of work item.
2. Firm, with name of principal, address and telephone number.
3. Scope.
4. Date of beginning of warranty, bond or service maintenance contract.
5. Duration of warranty, bond or service maintenance.
6. Provide information for Owner's personnel:

    a. Proper procedure in case of failure.
    b. Instances which might affect the validity of warranty or bond.

7. Contractor, name and responsible principal, address and telephone number.

1.8 FORM OF SUBMITTALS

A. Prepare in duplicate packets

B. Format:

1. Size 8-1/2 in. x 11 in. punch sheets for standard 3-ring binder.

    a. Fold larger sheets to fit into binders.

2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:

    a. Title of Project
    b. Name of Contractor.

C. Binders: Commercial quality, three-ring with durable and cleanable plastic covers.

1.9 ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting, reflecting adjustments to Contract Sum.

1. Original Contract Sum.
2. Additions and deductions resulting from:

    a. Previous change orders.
    b. Allowances.
    c. Unit prices.
    d. Deductions for uncorrected work.
    e. Penalties and bonuses.
    f. Deductions for liquidated damages.
    g. Deductions for re-inspection payments.
    h. Other adjustments.

3. Total Contract Sum, as adjusted.
4. Previous payments.
5. Sum remaining due.

B. Architect will issue a final Change Order, reflecting approved adjustments to the Contract Sum not previously made by Change Orders.

1.10 APPLICATION FOR FINAL PAYMENT

A. Submit Application for Final Payment in accordance with procedures and requirements in Conditions of the Contract.

B. Final payment will not be processed by Architect until all closeout submittals (See Paragraph 1.6) are received by Architect and all items are satisfactorily completed on the punch list compiled for Substantial Completion and Final Inspection.

END OF SECTION

SECTION 01 7200

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 DESCRIPTION

A. WORK INCLUDED

1. Throughout progress of the Work of this Contract, the Contractor shall maintain an accurate record or all changes in the Contract Documents, as described in Paragraph 3.1, below.
2. Upon completion of the Work of this Contract, the Contractor shall transfer the record changes to the Architect for the preparation of Record Documents.

B. RELATED WORK described elsewhere

| | |
|---|---|
| Shop Drawings, Project Data, and Samples | Section 01 3400 |
| Project Closeout | Section 01 7010 |

1.2 QUALITY ASSURANCE

A. GENERAL. Maintenance of Record Documents shall be the responsibility of one person on the Contractor's staff as approved in advance by the Architect.

B. ACCURACY OF RECORDS. Thoroughly coordinate all changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to properly show the change. Accuracy of records shall be such that future searcher for items shown in the Contract Documents may reasonably rely on information obtained from the approved Record Documents.

C. TIMING OF ENTRIES. Make all entries within 24 hours after receipt of information.

D. THE ARCHITECT AND THE OWNER shall examine the Contract Documents at selected intervals to assure Contract Compliance for updating entries. Should the Contractor fail to satisfy the requirements of this Section, the Owner shall withhold the Contractor's monthly request until said requirements are satisfied.

1.3 SUBMITTALS

A. GENERAL. The Architect's approval of the current status of Record Documents will be a prerequisite to the Architect's approval of requests for progress payment and request for final payment under the Contract.

B. FINAL SUBMITTAL. Prior to submitting final Application for Payment, submit the final Record Documents required by Contract to the Architect and secure his approval.

1.4 PRODUCT HANDLING

A. USE ALL MEANS necessary to maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of the recorded data to the final Record Documents. In the event of loss of recorded data, use all means necessary to secure the data to the Architect's approval, such means shall include, if necessary in the opinion of the Architect, removal and

replacement of concealing materials and, in such case, all replacements shall be to the standards originally specified in the Contract Documents.

## PART 2 PRODUCTS

### 2.1 RECORD DOCUMENTS

A. JOB SET. Promptly following award of Contract, secure from the Architect, at no charge to the Contractor, one complete set of all Documents comprising the Contract Documents and signed by the Contractor.

B. At initiation of project, Contractor shall request from the Architect/Engineer one set of reproducible sepias. The cost of these reproducibles shall be paid by the Contractor.

C. Transfer all information from the "Record Documents--Job Set" maintained during construction to the reproducible set, as changes or modifications are made.

D. Submit reproducible sepias with all "Record Documents" information to Architect/Engineer for review. Also submit set of "Record Documents" to Architect/Engineer.

## PART 3 EXECUTION

### 3.1 MAINTENANCE OF JOB SET

A. IMMEDIATELY UPON RECEIPT of job set described in 2.1.A above, identify each of the Documents with the title "RECORD DOCUMENTS - JOB SET."

B. PRESERVATION.

1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect.
2. Do not use the job set for any purpose except entry of new data and review by the Architect, until start of transfer of data to final Record Documents.
3. Maintain the job set at the site of Work as designated by the Architect.

C. MAKING ENTRIES ON DRAWINGS. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by note and by graphic lines, as required. Date all entries and incorporate entry from Subcontractor within 48 hours following completion of change. Call attention to the entry by a "cloud" around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes.

D. MAKING ENTRIES ON OTHER DOCUMENTS.

1. Where changes are caused by directive issued by the Architect, clearly indicate the change by note in ink, colored pencil, or rubber stamp.
2. Where changes are caused by Contractor originated proposals approved by the Architect, including inadvertent errors by the Contractor which have been accepted by the Architect, clearly indicate the change by note in erasable colored pencil.
3. Make entries in the pertinent Documents as approved by the Architect.

E. CONVERSION OF SCHEMATIC LAYOUTS

1. In most cases on the Drawings, arrangement of conduits and circuits, piping, ducts, and other similar items, is shown schematically and is not intended to portray precise physical layout. Final physical arrangement is as determined by the Contractor, subject to the Architect's approval. However, design of future modifications of the facility may require accurate information as to the final physical arrangement of items which are shown only schematically on the Drawings.
2. Shown on the job set of Record Drawings, by dimensions accurate to within 25 mm (1-inch) the centerline of each run of items such as are described in Paragraph 3.1.E.1, above. Clearly identify the item by accurate note such as "cast iron drain", galv. water", etc. Show by symbol or note, the vertical location of the item ("under slab", "in ceiling plenum", "exposed", etc.). Make all identification sufficiently descriptive that it may be related reliably to the Specifications including elevations of underground items.
3. The Architect may waive the requirements for conversion of schematic data where, in the Architect's judgement, such conversion serves no beneficial purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect.
4. Timing of entries. Be alert to changes in the Work from how it is shown in the Contract Documents. Promptly, and in no case later than 24 hours after the change has occurred and has been made known to the contractor, make the entry or entries required.

F. ACCURACY OF ENTRIES. Use all means necessary, including the proper tools and necessary labor for measurement, to determine actual locations of the installed items.

3.2 FINAL RECORD DOCUMENTS

A. THE PURPOSE of the final Record Documents is to provide factual information regarding all aspects of the Work, both concealed and visible, to enable future modification to proceed without lengthy and expensive site measurement, investigation, and examination.

B. THE OWNER shall not authorize final payment to the Contractor until all Final Record Documents have been submitted and approved by the Owner and Architect.

END OF SECTION

SECTION 02 0720

MINOR DEMOLITION FOR REMODELING

# 1 PART 1 GENERAL

## 1.1 SECTION INCLUDES

A. Removal of existing structures including concrete footing and utility piping.

B. Removal of masonry wall for new doors and windows.

C. Removal of finish materials such as flooring, suspended ceilings and walls.

D. Contractor shall refer to drawings including architectural, mechanical, plumbing and electrical for full extent of demolition required.

E. Contractor shall have all salvage rights except as shown for equipment to be reinstalled. Store these materials as needed to protect from damage.

## 1.2 RELATED SECTIONS

A. Section 01005 - Summary of Work.

B. Section 01500 - Construction Facilities and Temporary Controls: Security at Owner occupied areas.

C. Section 01701 - Contract Closeout: Project record documents.

## 1.3 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 7200.

B. Accurately record actual locations of capped utilities, subsurface obstructions, and plumbing connection location.

## 1.4 REGULATORY REQUIREMENTS

A. Conform to applicable local code for demolition work, safety of structure, dust control and security.

B. Obtain required permits from authorities.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct egress width to exits.

E. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to the Owner.

F. Conform to procedures applicable when discovering hazardous or contaminated materials.

## 1.5 SEQUENCING

A. Sequence work under the provisions of Section 01 0050.

1.6 SCHEDULING

A. Schedule work under the provisions of Section 01 3100.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

3.1 PREPARATION

A. Provide, erect, and maintain temporary barriers at locations required.

B. Protect existing materials and which are not to be demolished.

C. Mark location of utilities.

3.2 DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Maintain protected egress and access to the Work.

3.3 DEMOLITION

A. Disconnect and cap designated utilities within demolition areas.

B. Demolish in an orderly and careful manner. Protect existing roof and wall structure.

C. Except where noted otherwise, remove demolished materials from site. Do not burn or bury materials on site.

D. Remove demolished materials from site as work progresses. Upon completion of work, leave areas in clean condition.

E. Remove temporary Work.

END OF SECTION

SECTION 08 1113

METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-rated and fire rated rolled steel doors and frames

B. Window Frames

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 087100 Hardware

1.3 QUALITY ASSURANCE

A. Conform to the following requirements:

1. SDI-100 - Standard Steel Doors and Frames
2. SDI-105 - Recommended Erection Instructions for Steel Frames
3. DHI- Door Hardware Institute - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builders Hardware
4. Fire Rated Door and Frame Construction: NFPA 80
5. NOTE: Frames fabricated form WCGS are NOT acceptable

1.4 HARDWARE TEMPLATES

A. HARDWARE TEMPLATES shall be furnished to the fabricator by the hardware manufacturer. The fabricator shall drill and tap holes, and make cutouts and reinforcement in doors and frames to receive hardware in a neat and proper manner.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

A. LABELED DOORS AND FRAMES. Where noted or shown on the Drawings, furnish doors and frames tested in accord with ASTM E 152 and bearing the label of Underwriters Laboratories Inc. or Factory Mutual Engineering Corporation indicating applicable rating and wall opening classification specified.

B. SMOKE AND DRAFT CONTROL DOOR ASSEMBLIES

1. Installation. Install smoke and draft control door assemblies, tested in accord with UBC Standard 43-2, at head, jambs, and astragals at label cross-corridor doors and labeled door openings into fire-rated corridors and horizontal exits as noted on Door and Frame Schedule.

1.6 SUBMITTALS

A. SUBMIT SHOP DRAWINGS showing quantities, types, and locations. Door and frame construction shall be fully detailed showing weights of material, finish, framing, and reinforcing, and must indicate conformance with specified technical requirements.

1.7 DELIVERY STORAGE AND HANDLING

A. DELIVERY AND STORAGE. Doors shall be shipped individually packed. Ship frames with angle spreaders at door opening bottoms. Store doors and frames on the building site, in an upright position, under cover, on wood sills or floors, to prevent rust or damage. Ventilate canvas or plastic covers to prevent moisture traps.

## PART 2 PRODUCTS

### 2.1 DOOR AND FRAMES

A. Manufacturers:

1. Steelcraft
2. Ceco
3. Western Hollowmetal
4. Republic Builders Products So.
5. Elco Metal Products
6. Tex-Steel Corporation
7. Curries

### 2.2 HOLLOW METAL DOORS

A. FACE SHEETS AND FILLERS. Face sheets shall be 16-gauge cold-rolled, stretcher-leveled steel internally welded to steel stiffeners of sufficient strength and spacing to support face sheets against impact and to assure flat face sheet surfaces, or shall be bonded to a rigid polystyrene, polyurethane, or a resin-impregnated honeycomb core. It steel stiffeners are used, fill doors with mineral rock wool or fiberglass, or sound deaden inside faces of face steel.

B. VERTICAL EDGES shall be minimum 16-gauge channels with each face sheet wrapped around channels, meeting at center of edge, with the resulting seam closed; continuously face welded, and ground smooth.

C. TOP AND BOTTOM EDGES shall be 16-gauge steel channels. Back of channel shall be flush with top and bottom of face sheets. Inverted channels, if use, shall have filler caps. Tops shall be smooth and flush.

D. FABRICATED STILE AND RAIL DOORS from 16-gauge tubular steel with corners mitered, reinforced with channels, face welded and ground smooth.

E. HARDWARE PREPARATION. Doors shall be mortised, reinforced, drilled, and tapped for scheduled mortise hardware and reinforced for scheduled surface applied hardware. Hinge reinforcing shall be 7-gauge or heavier steel plate, continuous from top to bottom. Closer reinforcing shall be minimum 12-gauge steel, and other reinforcing shall be 14-gauge steel.

F. APPLY astragals to the active leaf of pairs of doors scheduled to receive them.

G. WELDS shall be ground invisible, and depressions shall be filled smooth.

H. LOUVERS for metal doors shall be sight proof, inverted "Y" type, and the size shown on the Drawings.

I. SHOP PAINT. After fabrication, thoroughly clean doors and degrease, phosphatize, and paint with a rust-inhibitive primer.

J. UNDERCUT doors ½ inch to clear carpet where indicated in the Room Finish Schedule.

2.3 PRESSED METAL FRAMES FOR DOORS, WINDOW, WINDOW WALLS AND BORROWED LITES

A. FABRICATE pressed metal frames of 16-gauge cold-rolled steel, for exterior doors and 18-gauge cold-rolled steel for interior doors, formed to types and profiles as shown on the Drawings. Beaks, angles, and arises shall be uniform, straight, sharply defined, and true. Provide knock down frame for installation in existing opening.

B. JAMB ANCHORS. Frames shall have adjustable anchors of 16-gauge corrugated steel, permanently fastened to frame, for setting into masonry partitions or other appropriate anchors provide other types of anchors when required for other conditions. Provide a minimum of three anchors per jamb for frames up to 90 inches high and four anchors per jamb for frames over 90 inches high.

C. REINFORCING. Buff, closer, and holder reinforcing shall be 3/16-inch thick steel, continuous for the full height or length of frame for exterior and vestibule doors, and minimum 14 gauge for strike, 12 gauge for closer, and 7-gauge for steel buffs, at other doors. Frames shall be mortised, reinforced, drilled, and tapped for scheduled mortise hardware, and shall be reinforced for surface-applied hardware. Weld dust covers over drilled reinforcements.

D. SHOP PAINT. After fabrication, thoroughly clean frames and degrease, phosphatize, and paint with a rust-inhibitive primer.

E. Frames for 1-3/4 inch doors shall be 9-gauge steel hinge reinforcement plated for 4-1/2 inch x 4/1/2 inch template type hinges, 14-gauge steel strike reinforcement, and 12-gauge steel for closer. Frames shall be mortised, reinforced, drilled, and tapped for scheduled mortise hardware, and shall be reinforced for surface-applied hardware.

F. ANCHORS. Frames shall be leveling screw anchors at jambs and two base anchors pre-punched for secure nailing or screwing to the wall.

G. SHOP PAINT. After fabrication, thoroughly clean frames, phosphatize and finish with one coat of rust-inhibitive primer.

2.4 MISCELLANEOUS ITEMS

A. FABRICATE MISCELLANEOUS ITEMS, including metal stops for special conditions shown on the Drawings, and other special shapes, to meet the specifications for pressed metal frames.

PART 3 EXECUTION

3.1 INSTALLATION OF PRESSED METAL DOORS, FRAMES, AND MISCELLANEOUS ITEMS

A. INSTALL FRAMES plumb, square, straight, true, rigidly secured in place and properly braced. Anchor frames securely to floor and at jambs. Weld field joints, grind smooth, and

sill with body putty to completely conceal seams, and to form a smooth unbroken finished surface. Where frames are anchored with bolts, shall be coutersunk and surface made smooth with putty. Hang hollow metal doors, preserving clearness. Install miscellaneous items as shown on Drawings.

3.2 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

END OF SECTION

SECTION 08 1416

WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wood doors; fire rated and non-rated. Pre-finished

B. Install door hardware.

1.2 SUBMITTALS

A. Shop Drawings: Indicate door elevations and cutouts for glazing.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with the following:

1. ANSI/NWWDA I.S.1.
2. Fire Door Construction: Conform to UL 10B.
3. Installed Door Assembly: Conform to NFPA 80 for fire rated class as scheduled.
4. AWI - Quality Standards Section 1300 and 1400, Premium grade

1.4 WARRANTY

A. Provide warranty under provisions of Section 01 7010 to the following term:

1. Life of Installation: Interior doors.

B. Include coverage for de-lamination of veneer, warping beyond specified installation tolerances and defective materials.

PART 2 PRODUCTS

2.1 DOOR TYPES

A. Acceptable Manufacturers:

1. Marshfield
2. Eggers
3. Buell
4. Algoma
5. Graham

B. Flush Interior Doors: 1-3/4 inches thick; solid core construction; fire rated as indicated. All doors to be five ply construction. Prefinished, color to be selected.

2.2 DOOR CONSTRUCTION

A. Solid Core, Non-Rated: ANSI/NWWDA, Type solid particle board equal to Marshfield DPC -

B. Solid Core, Fire Rated: ANSI/NWWDA, Type solid particle board core for 20 to 30 minutes

rated doors equal to Marshfield DFP 20/30. Where higher U.L. ratings are required, use material equal to Marshfield DFM Series.

2.3 FLUSH DOOR FACING

A. Wood Veneer: ANSI/NWWDA Premium grade; Plain Sliced White Birch, for transparent finish, slip matched.

B. Adhesive: ANSI/NWWDA, Type 1.

2.4 ACCESSORIES

A. Glass Stops: Rolled steel type conform to UL requirements. Note: Provide on all doors with glazing whether fire rated or not. Wood stops will not be accepted.

2.5 FABRICATION

A. Fabricate non-rated doors in accordance with ANSI/NWWDA I.S.1 requirements.

B. Fabricate fire rated doors in accordance with ANSI/NWWDA I.S.1 and to UL or Warnock-Hersey requirements. Attach fire rating label to door edge.

C. Astragals for Double Doors: Steel shaped, recessed at face edge.

D. Fabricate doors with hardware reinforcement blocking in place.

E. Factory machine doors for finish hardware.

2.6 FACTORY FINISH

A. Factory finish doors in accordance with WDMA G-17 Finish System Description or AWI Division 1500-S-4 - Finish System Standards. Factory finish to be water based stain and ultraviolet (UV) cured polyurethane to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations. Finish must meet or exceed performance standards of TR-6 catalyzed polyurethane. Color shall be Marshfield Door Systems Enviroclad UV™ Designer Color to be selected.

B. For standing and running trim use Pittsburgh Paint stain formulated to match Marshfield Door Systems Enviroclad Design color.

C. Factory finished doors to be installed just prior to substantial completion and covered to avoid damages.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install doors in accordance with manufacturer's instructions, NFPA 80 and ITS-WH/UL requirements.

B. Coordinate installation of glass and glazing.

C. Install door louvers, plumb and level.

D. Coordinate installation of doors with installation of frames specified in Section 08 1113 and

hardware specified in Section 08 7100.

E. Adjust door for smooth and balanced door movement.

F. Trim non-rated door width by cutting equally on both jamb edges.

G. Trim door height by cutting edge, 3/4" max.

3.2 INSTALLATION TOLERANCES

A. Maximum Diagonal Distortion: 1/8 inch measured with straight edge, corner to corner.

END OF SECTION

SECTION 08 3300

ROLLING STEEL COUNTER SHUTTERS

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 SECTION INCLUDES

A. Insulated Overhead Coiling Service Doors

1.3 RELATED SECTIONS

A. Section 05 10 00 - Structural Metal Framing.

B. Section 06 10 00 - Rough Carpentry.

C. Section 09 90 00 - Painting and Coating.

D. Section 26 05 00 - Common Work Results for Electrical.

1.4 REFERENCES

A. ASTM A480/A480M-04; 2004 - Standard Specification for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

B. ASTM A653/A653M-03; 2003 - Standard Specification for Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: For each type and size of overhead coiling door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
3. Include description of automatic closing device and testing and resetting instructions.

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer’s product data.

1. Include plans, elevations, sections, and mounting details
2. Include details of equipment assemblies and indicate dimensions, required clearances, and components.
3. Provide BIM models upon request.
4. Show controls, locking devices, [detectors] [fusible links], and other accessories.

D. Samples for Initial Selection: Upon request, provide manufacturer’s finish charts showing full

range of colors and textures available for units with factory applied finishes.

1. Include similar samples of accessories involving color selection

E. Samples for Verification: Upon request, provide for each type of exposed finish on the following components in manufacturer's standard sizes.

1. Curtain slats.
2. Bottom bar.

F. Closeout Submittals:

1. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Company specializing in the manufacturing of products specified in this section and with a minimum of five years of experience.

B. Installer Qualifications: Installer shall be authorized and qualified to install overhead door systems on the type and scope of project specified.

1. Maintenance Proximity: Not more than three hours normal travel time from installers place of business to project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of all materials in accordance with federal, state and local laws.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

A. Coordinate with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer's warranty that all parts and components are to be free from defects in materials and workmanship for 1 year.

B. Warranty: Manufacturer's warranty that all parts and components, except counterbalance spring and finish, are to be free from defects in materials and workmanship for 5 years. Counterbalance springs to be warrantied for 1 year.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: C.H.I. Overhead Doors, which is located at: 1485 Sunrise Dr. ; Arthur, IL 61911; Toll Free Tel: 800-590-0559; Fax: 217-543-4454; Email: AIA@chiohd.com; Web: www.chiohd.com.

B. Substitutions: In accordance with Specification Section 01 6300.

2.2 PERFORMANCE REQUIREMENTS

A. Insulated Overhead Coiling Service Doors

1. Wind Loads: Design door assembly to withstand a minimum of 20 psf in accordance with ASTM E330 using a 1.0 factor of safety.
2. Seismic Performance: Overhead coiling doors shall be evaluated for seismic performance to withstand the effect of earthquake motions determined according to ASCE/SEI 7.
3. Operation: Design complete door assembly including operator for use of not less than 50,000 cycles

B. Source Limitations: Provide overhead coiling doors from one manufacturer for each type of door. Provide operators and other accessories from source acceptable to overhead coiling door manufacturer.

2.3 MATERIALS

A. Galvanized Steel Sheet:

1. Galvanized commercial steel, (CS type) per ASTM A653/A653M, G90 and G60 coating class.

2.4 DOOR ASSEMBLY

A. Rolling Steel Counter Shutter

1. Basis of Design: C.H.I. Overhead Doors model 6500.
2. Construction:

a. Curtain: Constructed from interlocking slats formed from the following.

1) Front Slat Material:

a) 22 gauge #4 polished stainless steel slats.

2) Profile:

a) Flat, insulated, 1-1/2 inches high by 1/2 inch deep.

3) Bottom bar:

a) Stainless steel angles bolted back-to-back, with astregal.

b. Guides: Extruded, box shaped, two piece guide and mounting surface.

1) Guide Material:

a) Stainless steel

i) Guide Finish:

a. #4 polished stainless

c. Head Plate: Rectangular steel plate, with precision sealed ball bearings supporting drive side axle.

d. Barrel Assembly: 4-1/2 inch O.D. Steel pipe sized for maximum deflection under full load not to exceed 0.03” per foot of span with threaded rings or lugs welded to barrel assembly for curtain attachment.

e. Springs: Spring tension assembly supported within barrel by precision ball bearings. Curtain weight counterbalanced by oil tempered, helically wound torsion springs; grease packed and mounted on steel torsion shafts with cast spring plug.

1) Designed for minimum 10,000 cycles.

f. Hood: Shaped to fit within the head plates and with intermediate supports as required.

1) Hood Material:

a) Aluminum sheet

2) Hood Color:

a) Anodized aluminum

g. Locking Mechanism:

1) Stainless steel slide locks each side.

3. Mounting:

a. Face of wall and above lintel.

4. Manual Operation

a. Manual Pushup.

PART 2 EXECUTION

2.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for substrate construction and other conditions affecting performance of the work.

B. Examine locations of electrical connections.

C. Proceed with installation only after all unsatisfactory conditions have been corrected.

2.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor to adjacent construction without distortion or stress.

C. Fit and align door and shutter assembly including hardware, plumb, level and square to ensure smooth operation.

D. Complete wiring from operator to controls and components.

E. Coordinate installation of electrical service from power supply to operator.

F. Complete wiring from operator to controls and components.

G. Coordinate installation of electrical service from power supply to operator.

2.3 ADJUSTING

A. Adjust hardware and moving parts so that doors operate smoothly throughout full operating range.

B. Adjust seals to provide a tight fit around the entire perimeter.

2.4 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include twelve months full maintenance by skilled employees of installing company. Include quarterly preventive maintenance, repair or replace of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer’s authorized replacement parts and supplies.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24 hour per day, seven days per week, emergency callback service.

3.5 DEMONSTRATION

A. Demonstrate proper operation to Owner.

B. Perform fire door and shutter drop tests in presence of Owner or owner's representative. Require signature for manufacturer supplied drop test form.

3.6 SCHEDULE

A. Type B: 12’ wide x 4’ high opening.

B. Type C: 3’ wide x 4’ high opening.

END OF SECTION

SECTION 08 3800

TRAFFIC DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Food Service Doors.

B. Hardware and accessories.

1.2 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Operation and maintenance data.

C. Shop Drawings: Show fabrication and installation details; include door elevations, head, jamb, and meeting stile details including full or partial gaskets.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.4 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.5 WARRANTY

A. Manufacturer's standard two-year warranty that products are free of defects in material and workmanship, guaranteeing to replace (exclusive of freight and labor) parts proven defective within two years after date of shipment to purchaser.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Eliason Corporation; P.O. Box 2128, Kalamazoo, MI 49003. ASD. Tel: Tel: (800) 828-3655. Fax: (800) 828-3577. Email: doors@eliasoncorp.com www.eliasoncorp.com, www.restaurantdoors.net, and www.supermarketdoors.net

B. Substitutions: Items with same function and features will be considered with Section 01 6300.

2.2 FOOD SERVICE DOORS

A. Food Service Doors: 3/4 inch (19 mm) exterior grade solid wood core; 1 inch (25 mm) total thickness; light to medium duty.
   1. Facing: Reinforcing metal plates. (Model SCP-4)
      a. Full Length Panels: 0.032 inch (0.81 mm) tempered aluminum alloy, satin anodized finish, both sides, also edges.
      b. Base Plates: 12 inches (305 mm) high, 18 gauge (1.27 mm) stainless steel, both sides.
   2. Window Size: 9 inches (229 mm) wide by 14 inches (356 mm) high.
   3. Window Molding: Black rubber molding.
   4. Glazing: Clear acrylic.

2.3 HARDWARE AND ACCESSORIES

A. Hinges: Double Action Easy Swing(r) proprietary hinges.
   1. Finish: Zinc coated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify jambs plumb and square.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Minimum jamb construction of double studded 2 by 4 wood construction or equivalent.

C. Reinforce hollow metal jambs at hardware locations.

D. Steel channel jambs are required for heavy duty traffic doors.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 4113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings, and color Samples.

1. For entrance doors, include hardware schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design, engineer, fabricate, and install aluminum-framed storefronts to withstand structural loads indicated.

1. Limit deflection of framing members normal to wall plane to 1/175 of clear span or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
2. Limit deflection of framing members parallel to glazing plane to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

B. Structural Testing: Systems tested according to ASTM E 330 at 150 percent of inward and outward wind-load design pressures do not evidence material failures, structural distress, deflection failures, or permanent deformation of main framing members exceeding 0.2 percent of clear span.

C. Windborne-Debris Resistance: Framing system and doors pass basic-protection testing requirements in ASTM E 1996 for Wind Zone 3 when tested according to ASTM E 1886.

D. Air Infiltration: Limited to 0.06 cfm/sq. ft. of fixed framing and glass area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft.

E. Water Penetration: Systems do not evidence water leakage when tested according to ASTM E 331 at minimum differential pressure of 20 percent of positive wind-load design pressure but not less than 6.24 lbf/sq. ft.

F. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than [0.45 Btu/sq. ft. x h x deg F.

2.2 ALUMINUM-FRAMED STOREFRONTS

A. Acceptable Maunfacturers

1. Kawneer
2. USG
3. Arcadia

4. Others in accordance with Specification Section 01 6300.

B. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated; ASTM B 209.

C. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken

D. Doors: 1-3/4-inch- thick glazed doors with minimum 0.125-inch- thick, 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. Provide snap-on, extruded-aluminum glazing stops and preformed gaskets.

1. Door Design: Medium stile; 3-1/2-inch nominal width.
2. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
3. Interior Doors: Provide BHMA A156.16 silencers, three on strike jamb of single-door frames and two on head of double-door frames.
4. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
5. Hardware: Manufacturer Standard push/pull, deadbolt lock, closer, threshold, weatherstripping, continuous hinges.

E. Glazing:

1. Door glazing tube 5/8” thick insulating glass clear over clear.
2. Window glazing to be 1” thick insulating glass, ¼” clear with low-E coating exterior and ¼” clear interior pane.

F. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

G. Fasteners and Accessories: Compatible with adjacent materials, corrosion resistant, nonstaining, and nonbleeding. Use concealed fasteners except for application of door hardware.

H. Fabrication: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory-assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

1. Door Framing: Reinforce to support imposed loads. Factory-assemble door and frame units and factory-install hardware to greatest extent possible. Reinforce door and frame units for hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

I. Aluminum Finish: Class II, clear anodic finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Isolate metal surfaces in contact with incompatible materials, including wood, by painting contact surfaces with bituminous coating or primer or by applying sealant or tape recommended by manufacturer.

B. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install framing components true in alignment with established lines and grades to the following tolerances:

1. Variation from Plane: Limit to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment: For surfaces abutting in line, limit offset to 1/16 inch. For surfaces meeting at corners, limit offset to 1/32 inch.
3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

E. Install doors without warp or rack. Adjust doors and hardware to provide tight fit at contact points and smooth operation.

END OF SECTION

SECTION 08 5113

ALUMINUM WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Extruded aluminum windows with fixed sash; glass shop glazed.

B. Perimeter sealant.

1.2 RELATED SECTIONS

A. Section 07 9200 - Joint Sealers: Perimeter sealant and back-up materials.

1.3 REFERENCES

A. AAMA 101-88 - Specifications for Aluminum Windows.

B. AAMA 603.8 - Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.

C. ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors.

D. ASTM E331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

1.4 SYSTEM DESCRIPTION

A. Windows: Single thickness aluminum sections, shop fabricated, factory pre-finished, vision glass, related flashings, anchorage and attachment devices.

B. Configuration: Fixed.

C. Glazing: Interior. Double pane 1” thick.

1.5 PERFORMANCE REQUIREMENTS

A. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall to a design pressure of 25 lb/sq ft as measured in accordance with ASTM E330.

B. Limit member deflection to 1/200 with full recovery of glazing materials.

C. System to accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing, deflection of lintel.

D. Limit air leakage through assembly to 0.16 cfm/ft. for sash, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.

E. Water Leakage: None, when measured in accordance with ASTM E331 with a test pressure difference of 6 lbf/sq ft.

F. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

G. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.6 SUBMITTALS

A. Submit under provisions of Section 01 3400.

B. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work; and installation requirements.

C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements and furnish copies of test data.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA 101-88.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01630.

B. Protect pre-finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and after installation of sealants.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Kawneer

B. Old Castle

C. Arcadia

B. Substitutions in accordance with Section 01 6300

2.2 COMPONENTS (EXTERIOR WINDOWS)

A. Frames: Minimum 4 inch wide section thermally broken with interior portion of frame insulated from exterior portion flush applied glass stops of snap-on type.

2.3 PRODUCTS

A. Non-operable Windows: Kawneer Trifab 45IT aluminum storefront. Color: Clear Anodized.

B. Glass shall not be less than “B” quality and “DSB”, shall conform to FS DD-G451D. Standard factory glazing shall be DSB 1-inch insulating glass, Low E. Sealed insulating glass, where used, shall meet SIGMA No. 65-7-2 and be of at least “A” quality. Safety glazing materials, where used, shall meet ANSI A-97. Tempered glazing, where used, shall meet AATM C 1048.

2.4 SEALANT MATERIALS

A. Glass shall be set in channel type vinyl gaskets (marine glazing). Vinyl shall be of materials compatible with aluminum which will not promote corrosion and shall be resistant to deterioration by all forms of weathering and shall be suitably retained to maintain a watertight seal between the glass and its surrounding frame. Flexible vinyl, where used, shall be equal to Commercial Standard CS 230-60.

2.5 HARDWARE

A. Locking arrangement at the meeting rail shall be of the cam action type pulling sash together and made of white bronze. All latching arrangements shall be easily replaced or repaired without disassembly of sash members.

2.6 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to ensure concealment from view.

E. Prepare components with internal reinforcement for operating hardware.

F. Shop glaze window units.

2.7 FINISHES

A. The exposed surfaces of all aluminum members shall be clean and free from serious surface blemishes. Painted finish to be electrostatic baked Fluropon and shall meet AAMA 605.2.

B. Apply one coat of bituminous paint to concealed aluminum [and steel] surfaces in contact with cementitious or dissimilar materials.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install window system in accordance with AAMA 101 - Specifications for Aluminum Windows.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work.

D. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

E. Coordinate attachment and seal of perimeter air and vapor barrier materials.

F. Install operating hardware.

G. Install perimeter sealant to method required to achieve performance criteria.

3.2 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 09 2900

GYPSUM BOARD SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Gypsum board.

D. Taped and sanded joint treatment.

E. Texture finish.

1.2 RELATED SECTIONS

A. Section 06 1000 - Wood Blocking and Curbing.

B. Section 07 2100 - Thermal Insulation.

C. Section 09 9623 - Painting: Surface Finish.

1.3 REFERENCES

A. ASTM C36 - Gypsum Wallboard.

B. ASTM C79 - Gypsum Sheathing Board.

C. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.

D. ASTM C630 - Water Resistant Gypsum Backing Board.

E. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.

F. ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.

G. ASTM C840 - Application and Finishing of Gypsum Board.

H. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board.

I. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

J. GA-600 - Fire Resistance Design Manual.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 3400.

B. Shop Drawings: Indicate special details associated with fireproofing, and acoustical seals.

C. Product Data: Provide data on metal framing, gypsum board, joint tape and accessories.

D. Samples: Submit two samples of pre-decorated gypsum board, 24 x 24 inch in size illustrating finish and texture.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with GA-216.

B. Maintain one copy of document on site.

1.6 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum five years documented experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - GYPSUM BOARD SYSTEM

A. Gypsum Board Products

1. United States Gypsum
2. Centex
3. Georgia-Pacific
4. Gold Bond

B. Metal Framing and Accessories

1. United States Gypsum
2. Dale/Incor
3. Deitrich
4. Gold Bond

2.2 PANEL PRODUCTS

A. Interior Bearing Walls - See Structural.

B. Studs and Tracks: ASTM C645; galvanized sheet steel, 25 gage shape, with knurled faces, or other noted on plans and details.

C. Furring, Framing and Accessories: ASTM C645. and GA-216

D. Fasteners: ASTM C1002. and GA-216.

E. Anchorage to Substrate: Tie wire, screws and other metal supports, of type and size to suit application; to rigidly secure materials in place.

F. Adhesive: GA-216.

2.3 GYPSUM BOARD MATERIALS

A. Fire Rated Gypsum Board: ASTM C36; fire resistive type, UL rated; 5/8 inch thick, maximum permissible length; ends square cut, tapered edges.

B. Water - Resistant (WR): 5/8 inch thick maximum permissible length; ends square cut, tapered edges. Provide at restrooms plumbing fixture wall.

2.4 ACCESSORIES

A. Acoustical Insulation: See Section 07 2100.

B. Corner Beads: Dura-Bead by USG or equal.

C. Edge Trim: 200 A Metal Trim by USG or equal.

D. Joint Materials: ASTM C475; reinforcing tape, joint compound, adhesive, and water.

E. Fasteners: ASTM C1002, Type S and S12.

PART 3 - EXECUTION

3.1 METAL STUD INSTALLATION

A. Install studs in accordance with GA-216.

B. Metal Stud Spacing: 16 or 24 inches on center.

C. Refer to Drawings for indication or partitions extending to finished ceiling only and for partitions extending through the ceiling to the structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.

D. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.

E. Blocking: Screw nail wood blocking to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and other surface mounted equipment.

3.2 CEILING FRAMING INSTALLATION

A. Install in accordance with GA-216.

B. Coordinate location of hangers with other work. Provide wire hangers at4’-0” o.c. each way and maximum 6” from the ends.

C. Install ceiling framing independent of walls, columns, and above ceiling work.

D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

E. Laterally brace entire suspension system.

3.3 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA-216.

B. Erect single layer standard gypsum and Fiberbound board horizontal-vertical, with ends and edges occurring over firm bearing.

C. Erect exterior gypsum sheathing horizontally, with edges butted tight and ends occurring over firm bearing.

D. Use screws when fastening gypsum board to metal furring or framing.

3.4 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

C. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.

3.5 TEXTURE FINISH

A. Spray apply finish texture coating in accordance with manufacturer's instructions.

B. Provide a 2' x 2' sample of the proposed orange peel texture for Architect's approval prior to starting texture.

3.6 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

B. Maximum variance under wallcoverings shall be 1/16 inch per foot.

3.7 SCHEDULE

A. Provide Type 'x' gypsum board at all areas not listed below.

B. Water Resistant in all restrooms, at plumbing fixture wall.

END OF SECTION

SECTION 09 5113

SUSPENDED CEILINGS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Non-fire rated suspended metal grid systems complete with wall trim.

B. Lay-in ceiling boards; non-fire rated.

1.2 RELATED WORK

A. Lighting fixtures within ceiling system.

B. Air Diffusers within ceiling system.

1.3 REFERENCE STANDARDS

A. ASTM C-635, Metal Suspension Systems for Acoustical Tile and Lay-in Panel Systems.

B. ASTM C-636, Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. ASTM E-413, Classification for Determination of Sound Transmission Class.

D. FS SS-S-118A, INT AMD 4, Sound Controlling Blocks and Boards (Acoustical Tiles and Panels, Prefabricated).

1.4 ENVIRONMENTAL CONDITIONS

A. DO NOT install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead mechanical and electrical work is completed, tested and approved.

B. Permit wet work to dry prior to commencement of installation.

C. Maintain uniform temperatures of minimum 60 degrees F. and humidity of 20% to 40% prior to, during and after installation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers:

1. USG Interiors, Inc.
2. Armstrong Cork Co.
3. The Celotex Corp.

B. Substitutions: Items of same function and performance are acceptable in conformance with Section 01 6300.

2.2 SUSPENSION SYSTEM

A. Type and Manufacturer: Non-fire rated 200 Snap-Grid Systems manufactured by Chicago Metallic Corporation, conforming to ASTM C-635 intermediate duty system. Color as selected. Donn and Armstrong are approved substitutes.

B. Accessories: Stabilizer bars, splices, edge moldings, and hold down clips as required to complete and complement suspended ceiling grid system.

C. Materials/Finish: Commercial quality cold rolled steel with galvanized coating; finish on exposed surfaces.

D. Carrying Channels and Hangers: Galvanized steel, size and type to suit application and to rigidly secure the complete acoustic unit ceiling system, with maximum deflection of 1/360.

2.3 LAY-IN PANELS

A. Type C1 - Provide in all areas. 24" x 48" x ¾" thick; lay-in-fire-retardant material fiber; factory applied washable white vinyl latex paint finish. NRC .55. Armstrong Cortega Second Look II.

B. Type C3. 24"x48"x5/8" thick, wet formed mineral fiber with latex paint finish. Armstrong, Kitchen Zone or equal. Certianteed, Vinylrock or National Gridstone are approved.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install acoustical ceiling systems in accordance with ASTM C-636 to produce finished ceiling true to lines and levels and free from warped, soiled or damaged grid or lay-in panels.

B. Do not install any tile less than half a tile without approval of the architect. Center tile in room unless directed otherwise.

C. Install acoustical ceiling systems in accordance to U.B.C. Standards. Section 47.1812, 47.1813, and 47.1814. These sections are included herein;

1. Installation - Sec. 47.1812.

a. Vertical Hangers: Suspension wires shall be not smaller than No. 12 gage spaced at 4 feet on center along each main runner unless calculations justifying the increased spacing are provided.

Each vertical wire shall be attached to the ceiling suspension member and to the support above with a minimum of three turns. Any connection device at the supporting construction shall be capable of carrying not less than 100 pounds.

Suspension wires shall not hang more than 1 in 6 out-of-plumb unless counter sloping wires are provided.

Wires shall not attach to or bend around interfering material or equipment. A trapeze or equivalent device shall be used where obstructions preclude direct

suspension. Trapeze suspensions shall be a minimum of back-to-back 1-1/4 inch cold-rolled channels for spans exceeding 48 inches.

b. Perimeter Hangers: The terminal ends of each cross runner and main runner shall be supported independently a maximum of 8 inches from each wall or ceiling discontinuity with No. 12 gage wire or approved wall support.

c. Lateral Force Bracing: Where substantiating design calculations are not provided, horizontal restraints shall be effected by four No. 12 age wires secured to the main runner within 2 inches of the cross runner intersection and splayed 90 degrees from each other at an angle not exceeding 45 degrees from the plan of the ceiling. These horizontal restraint points shall be placed 12 feet on center in both directions with the first point within 4 feet from each wall. Attachment of the restraint wires to the structure above shall be adequate for the load imposed.

d. Perimeter Members: Unless perimeter members are a structural part of the approved system, wall angles or channels shall be considered as aesthetic closers and shall have no structural value assessed to themselves or their method of attachment to the walls. For tile ceilings, ends of main runners and cross members shall be tied together to prevent their spreading.

e. Attachment of Members to the Perimeter: To facilitate installation, main runners and cross runners may be attached to the perimeter member at two adjacent walls with clearance between the wall and the runners maintained at the other two walls or as otherwise shown or described for the approved system.

2. Lighting Fixtures - Sec. 47.1813: Only "intermediate" and "heavy duty" ceiling systems as defined in Section 47.1802 may be used for the supporting of lighting fixtures.

   All lighting fixtures shall be positively attached to the suspended ceiling system. The attachment device shall have a capacity of 100 percent of the lighting fixture weight acting in any direction.

   When "intermediate" systems are used, No. 12 gage hangers shall be attached to the grid members within 3 inches of each corner of each fixture. Tandem fixtures may utilize common wires.

   Where "heavy-duty" systems are used, supplemental hangers are not required if a 48-inch modular hanger pattern is followed. When cross runners are used without supplemental hangers to support lighting fixtures, these cross runners must provide the same carrying capacity as the main runner.

   Lighting fixtures weighing more than 20 pounds but less than 56 pounds shall have, in addition to the requirements outlined above, two No. 12 gage hangers connected from the fixture housing to the ceiling system hangers or to the structure above. These wires may be slack.

   Lighting fixtures weighing 56 pounds or more shall be supported directly from the structure above by approved hangers.

   Pendant-hung lighting fixtures shall be supported directly from the structure above using No. 9 gage wire or approved alternate support without using the ceiling suspension system for direct support.

3. Mechanical Services - Sec. 47-1814: Ceiling mounted air terminals or services weighing less than 20 pounds shall be positively attached to the ceiling suspension

main runners or to cross runners with the same carrying capacity as the main runners.

Terminals or services weighing more than 20 pounds but less than 56 pounds, in addition to the above, shall have two No. 12 gage hangers connected from the terminal or service to the ceiling system hangers or to the structure above. These wires may be slack.

Terminals or services weighing more than 56 pounds shall be supported directly from the structure above by approved hangers.

D. Install ceiling systems in a manner capable of supporting all superimposed loads, with maximum permissible deflection of 1/360 of span and maximum surface deviation of 1/8 inch in 10 ft. (1/960).

E. Install after all above-ceiling work is complete. Coordinate the location of hangers with other work. Ensure the layout of hangers and carrying channels is located to accommodate fittings and units of equipment which are to be placed after the installation of ceiling grid systems.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest adjacent hangers and related carrying channels as required to span the required distance.

G. Supply hangers or inserts for installation to the respective section in ample time and with clear instructions for their correct placement. If steel deck is not supplied with hanger tabs, coordinate the installation of hanger clips during steel deck erection. Provide additional hangers and inserts as required.

H. Hang independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of the longitudinal axis or face plans of adjacent members.

I. Lay-out according to drawings.

J. Do not install fixtures so that main runners and cross runners will be eccentrically loaded. Where fixture installation would produce rotation of runners, provide stabilizer bars.

K. Install edge moldings at intersection of ceiling and vertical surfaces, using maximum lengths, straight, true to line and level. Miter corners. Provide edge moldings at junctions with other ceiling finishes.

L. Fit acoustic lay-in panels in place, free from damaged edges or other defects detrimental to appearance and function. Fit border units neatly against abutting surfaces.

M. Install lay-in panels level, in uniform plane and free from twist, warp and dents.

N. Install hold-down clips on all lay-in panels to hold such panels tight to grid system where within 20 ft. of an exterior door.

## 3.2 ADJUSTMENTS

A. Adjust any sags or twists which develop in the ceiling systems and replace any part which is damaged or faulty.

## 3.3 EXTRA TILE

A. Provide Owner with one carton of extra tile of each type installed.

END OF SECTION

SECTION 09 6519

LUXURY VINYL TILE FLOORING

PART 1 GENERAL

1.1 WORK INCLUDED

A. Preparation of substrate surfaces.

B. Application of Vinyl-Plank Floor.

C. Application of Vinyl Base.

D. Cleaning of all surfaces of areas of work.

1.2 RELATED WORK

A. Section 03 3000: Finish troweling of floor slab.

1.3 REFERENCES

A. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl-Asbestos, Vinyl Composition.

B. FS L-F-450 - Flooring, Vinyl Plastic.

C. FS SS-W-40 - Wall Base: Rubber and Vinyl Plastic.

1.4 SAMPLES

A. Submit samples in accordance with Section 01 3400.

B. Include duplicate 3 inch x 3 inch sized samples of each flooring material, color and pattern to be selected by Architect/Engineer.

C. Include duplicated 1-1/2 inch long samples of base.

1.5 EXTRA MATERIAL

A. Deliver two boxes of each color and pattern of floor material required for project, for maintenance use.

B. Clearly identify each box/roll.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Aladin, Grass Valley Series

B. Substitutions in accordance to Section 01 6300.

2.2 FLOOR COVERING MATERIALS

A. Flooring Type 2: Luxury Vinyl Tile. 2.5mm, glue down 8”x48”. Conforming to ASTM F1700, Class III.

2.3 BASE MATERIALS

A. Base: Conforming to FS SS-W-40 Type II vinyl; type set coved, 4 inches by 1/8 thick, color selected by Owner, manufactured by Flexco, Roppe Rubber or Johnsonite.

2.4 ACCESSORIES/ADHESIVES/SEALERS

A. Edge Strips: 2 part, Snap in Reducer type; smooth finish; color selected by Owner. 1" width. Provide at LVT to carpet transitions

B. Primers and Adhesives: Waterproof; of types recommended by resilient flooring manufacturer for specific material.

C. Sealer and Wax: Type recommended by resilient flooring manufacturer for type and location.

PART 3 EXECUTION

3.1 SITE AND SUBSTRATE CONDITIONS

A. Ensure floor surfaces are smooth and flat with maximum variation of 1/8 inch in 10 feet (1/960).

B. Ensure concrete floors are dry and exhibit negative alkalinity, carbonization or dusting.

C. Maintain minimum 70 deg. F. air temperature at flooring installation area for 3 days prior to, during, and for 24 hours after installation.

D. Store flooring materials in area of application. Allow 3 days for material to reach equal temperature as area.

3.2 LEVELING

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

B. Clean floor and apply, trowel and float filler to leave smooth, flat hard surface. Prohibit traffic until filler is cured.

3.3 INSTALLATION - FLOORING

A. Open floor tile cartons, enough to cover each area, and mix tile to ensure shade variations do not occur within any one area.

B. Clean substrate. Spread cement evenly in quantity recommended by manufacturer to ensure adhesion over entire area of installation. Spread only enough adhesive to permit installation of flooring before initial set.

C. Set flooring in place, press with heavy roller to ensure full adhesion.

D. Lay flooring with joints and seams parallel to building lines to produce minimum number of seams.

E. Install with minimum tile width 1/2 full size at room or area perimeter, to square grid pattern with all joints aligned.

F. Terminate resilient flooring as shown on drawings. If not indicated at centerline of door openings where adjacent floor finish is dissimilar.

G. Install edge strips at unprotected or exposed edges where flooring terminates.

H. Scribe flooring to walls, columns, cabinets, floor outlets and other appurtenances to produce tight joints. Gaps greater than 1/16" around door frames will be rejected and replaced.

3.4 INSTALLATION - BASE

A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.

B. Miter internal corners. Use pre-molded sections for external corners and exposed ends.

C. Install base on solid backing. Adhere tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other obstructions.

E. Provide base at all cabinet work.

F. Install straight and level to variation of plus or minus 1/8 inch over 10 feet.

3.5 PROTECTION

A. Prohibit traffic from floor finish for 48 hours after installation.

3.6 CLEAN-UP

A. Remove excess adhesive from floor, base and wall surfaces without damage.

B. Clean floor and base surfaces in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 09 6816

CERAMIC TILE

PART 1 GENERAL

1.1_ SECTION INCLUDES

A. Ceramic tile floor, base and wall finish using the thinset application method at walls and on floor.

1.2 SUBMITTALS

A. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar material, and thresholds.

B. Product Data: Provide material specifications, characteristics, and instructions for using adhesives and grouts.

C. Samples: Submit full range of colors available in specified tile types.

D. Maintenance Instructions: Include recommended cleaning methods, cleaning materials, stain removal methods and polishes and waxes. Submit per Section 01 7010.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI/TCA A137.1. TCA Handbook for Ceramic Tile Installation and ANSI/TCA A108.3.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Daltile

B. Summitville

C. American-Olean

D. Crossville

2.2 TILE MATERIALS

A. Ceramic Wall Tile: ANSI/TCA A137.1

1. Daltile, Quarry Tile 6”x6”. Blaze Flash OQ41(2).

B. Ceramic Base Tile

1. Daltile, Quarry Tile. 6”x6” Bullnose, Q1665

2.3 SETTING MATERIALS

A. Leveling Material: Laticrete 254 Platinum

B. Waterproofing: Laticrete Hydro Ban

C. Leveling Mortar: Laticrete 254 Platinum

D. Thin-set Mortar: Laticrete 4XLT

2.4 GROUT MATERIALS

A. Laticrete Spectralock Pro Grout, Epoxy. Color as selected from standard line. Onsite mix or premixed at installers option.

2.5 GROUT MIX

A. Mix and proportion setting bed and grout materials in accordance with manufacturer's instruction ANSI/TCA A108.5 and TCA Handbook for Ceramic Tile Installation.

PART 3 EXECUTION

A. SUBSTRATE EXAMINATION: Verify that wall surfaces to be covered with porcelain tile are:

1. Sound and conform to good design/engineering practices; rigid, with maximum deflection of L/360 distributed uniformly over the span.
2. Clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil or loose plaster, paint and scale.
3. Maximum variation in the backing surface: ¼" in 10' from the required plane.
4. Advise General Contractor and Architect of any surface or substrate conditions requiring correction before stone work commences. Beginning of work constitutes acceptance of substrate or surface conditions.

B. SURFACE PREPERATION:

1. Clean surface to remove any surface contaminates. Use a power wash to rinse and remove all residue and allow surface to dry.
2. Prior to application of the Hydro Ban use LATICRETE 254 Platinum for leveling and smoothing the surface up to 3/8".
3. Use LATICRETE 3701 Fortified Mortar Bed for leveling up to ½" per lift. Two or more applications may be required for a thicker leveling coat. Mix and install in accordance with LATIDRETE 3701 Fortified Mortar Bed Datasheet DS 100.0 instructions. Allow to sure 24 hours at 70 degrees F.

C. TILE INSTALLATION: Install using TCA Handbook Method #W202. Thin Bed Method: Install tile with LATICRETE 4XLT. Clean back of tile with a damp sponge to remove dust and foreign debris. Use the appropriate size notched trowel to insure full mortar coverage of the tile. "Burn in" mortar on substrate with the flat side of the trowel before notching to insure good surface contact. Comb mortar with notched side of the trowel in one direction. "Back butter" the back side of each tile with the flat side of the trowel before placement into the mortar bed to insure good contact and full coverage. Lift pieces of tile occasionally to verify full mortar coverage on back. Spread only as much adhesive as can be covered in 10 - 20 minutes or while adhesive surface is still wet and tacky. Beat each piece into adhesive with a rubber mallet to insure full bedding and flat, level joints. Clean off excess adhesive from the surface of the tile with a damp cloth or sponge while the adhesive is fresh. Allow installation to set firm. Install with 3/8" joints.

D. GROUTING: Allow tile installation to cure a minimum of 24 hours at 70 degrees F. before grouting. Grout with LATICRETE PermaColor Datasheet DS 250.0 instructions.

E. EXPANSION JOINTS: Provide and install expansion joints as per TCNA EJ171 and as specified by architect. Joint recommendations are 20' in each direction for interior applications. Existing joints in subsurface must be carried through tile work. Install expansion joints where stone abuts restraining surfaces such as perimeter walls, curbs, columns, corners, pipes, dissimilar wall finish and where changes occur in backing materials. Use LATICRETE Latasil for these joints.

3.1 EXTRA TILE

A. Provide Owner with 5% of total square footage of extra tile for each type/color installed.

END OF SECTION

SECTION 09 7700

FIBERGLASS REINFORCED WALL PANELS

PART 1 - GENERAL

## 1.1 SUMMARY

A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to unfinished gypsum wallboard.
   1. PVC trim.

B. 1. Products Not Furnished or Installed under This Section:
   1. Gypsum substrate board.
   2. Ceramic Base.

## 1.2 RELATED SECTIONS

A. Section 09 2900 – Gypsum substrate board.

B. Section [____] - Wood [Metal] Stud Framing

C. Section 09 9623 - Painting & Transparent Finishes.

D. Section 09 6519 Ceramic tile Base.

## 1.3 REFERENCES

A. American Society for Testing and Materials: Standard Specifications (ASTM)
   1. ASTM D 256 - Izod Impact Strengths (ft #/in)
   2. ASTM D 570 - Water Absorption (%)
   3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
   4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
   5. ASTM D 2583- Barcol Hardness
   6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
   7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

## 1.4 SUBMITTALS

A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.

C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.

D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.
   1. Submit complete with specified applied finish.
   2. For selected patterns show complete pattern repeat.
   3. Exposed Molding and Trim: Provide samples of each type, finish, and color.

E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site.

## 1.5 QUALITY ASSURANCE

A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
   1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
      a. Wall Required Rating – Class A.

## 1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials factory packaged on strong pallets.

B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

## 1.7 PROJECT CONDITIONS

A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work

B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
   1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

## 1.8 WARRANTY

A. Furnish one-year guarantee against defects in material and workmanship.

# PART 2 - PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURER

A. Marlite; 1 Marlite Drive, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.

B. Product:

1. Standard FRP

2.2 PANELS

A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
   1. Dimensions:
      a. Thickness – 0.090 “ (2.29mm) nominal
      b. Width - 4'-0” (1.22m) nominal
      c. Length – 9’-0” (3.0m) nominal
   2. Tolerance:
      a. Length and Width: +/-1/8 “ (3.175mm)
      b. Square - Not to exceed 1/8 “ for 8 foot (2.4m) panels or 5/32 “ (3.96mm) for 10 foot (2.4m) panels

B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
   1. Flexural Strength - $1.7 \times 10^4$ psi per ASTM D 790.
   2. Flexural Modulus – $6.0 \times 10^5$ psi per ASTM D 790.
   3. Tensile Strength – $8.0 \times 10^3$ psi per ASTM D 638.
   4. Tensile Modulus – $9.43 \times 10^5$ psi per ASTM D 638.
   5. Water Absorption - 0.17% per ASTM D 570.
   6. Barcol Hardness (scratch resistance) of 30 as per ASTM D 2583.
   7. Izod Impact Strength of 7.0 ft. lbs./in ASTM D 256

C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

D. Front Finish: pebbled

Specifier Note: Marlite’s Standard FRP panels are available in several configurations, including Class A (I) and Class C (III) Fire-rated, along with various surface textures – smooth and pebble. Color: white

a. Size: [Specifier to choose, or as indicated on drawings.] standard sizes are;

1) Marlite Standard FRP

a) 48” x 108” [1.2m x 2.7m] x .090” (3mm) nom.

a.

E. PVC Trim: Thin-wall semi-rigid extruded PVC.
   1. M 350 Inside Corner, 10’ length]
   2. M 360 Outside Corner, 10’ length]
   3. M 365 Division, 10’ length]
   4. M 370 Edge, 10’ length]
   5. Color: White

2.3 ACCESSORIES

A. Fasteners: Non-staining nylon drive rivets.
   1. Match panel colors.
   2. Length to suit project conditions.

B. Adhesive: Either of the following construction adhesives complying with ASTM C 557.
   1. Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive.

C. Sealant:
   1. Marlite Brand MS-250 Clear Silicone Sealant.

## 2.4 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
   1. Verify that stud spacing does not exceed 24” (61cm) on-center.

B. Repair defects prior to installation.
   1. Level wall surfaces to panel manufacturer’s requirements. Remove protrusions and fill indentations.

## 2.5 INSTALLATION

A. Comply with manufacturer's recommended procedures and installation sequence.

B. Cut sheets to meet supports allowing 1/8” (3 mm) clearance for every 8 foot (2.4m) of panel.
   1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
   2. Pre-drill fastener holes 1/8” (3mm) oversize with high speed drill bit.
      a. Space at 8” (200mm) maximum on center at perimeter, approximately 1” from panel edge.
      b. Space at in field in rows 16’ (40.64cm) on center, with fasteners spaced at 12” (30.48 cm) maximum on center.

C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
   1. Install panels with manufacturer's recommended gap for panel field and corner joints.
      a. Adhesive trowel and application method to conform to adhesive manufacturer’s recommendations.
      b. Drive fasteners for snug fit. Do not over-tighten.

D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
   1. All moldings must provide for a minimum 1/8 “(3mm) of panel expansion at joints and edges, to insure proper installation.
   2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

## 2.6 CLEANING

A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.

B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION

SECTION 09 9623

PAINTING

PART 1 GENERAL

1.1 RELATED DOCUMENT

A. The Drawings and General Conditions of the Contract, including General Conditions and Supplementary General Conditions, apply tot he work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Extent of Painting: Gypsum board, H.M. frames/doors. Sealing of CMU. Pipe Bollards. Paint striping.

B. Miscellaneous Surfaces: Paint doors and frames, and similar items with gloss enamel in decorator colors as selected.

C. Excluded Items: The following items and surfaces are specifically excluded from painting requirements.

1. Materials with factory-applied finish coats, except for matching touch-up requirements and roof-mounted units.
2. Materials which have integral color finish, such as aluminum, glass, floor coverings, acoustical tile and integral color plaster.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer, and use only within recommended limits.

1.4 SUBMITTALS

A. Submit a complete list of all paints and coatings proposed for use on the project, along with all manufacturer's data required to establish equality and conformance with the Specifications. Substitutions are not permitted after approval of submittal data.

B. Colors: Colors as selected by the Architect from the manufacturer's standard color line. Use only factory mixed colors, except that minor tinting may be performed on the job as required.

1.5 DELIVERY AND STORAGE

A. Deliver and store materials in the manufacturer's original containers with labels intact and seals unbroken. Labels shall bear the manufacturer's name, product name, product identification number or formula, date of manufacture and pot life (or use deadline date) and printed directions for the use of the material.

B. Storage: Store paint materials only in well ventilated areas set aside for the purpose. Protect the floors and walls from paint stains. Keep spaces clean and orderly. Store rags, paint solvents, and similar items in closed metal containers at all times.

1.6 JOB CONDITIONS

A. Acceptance of Surface: The application of any paint or coating shall constitute acceptance of that surface as suitable. Correct surface defects as required. In the event of incompatibility of materials, the problem shall be resolved prior to any application.

B. Lighting: Provide not less than twenty (20) foot candles illumination for all surfaces to be painted or coated.

1.7 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Products by the following manufacturing companies are acceptable when the specific products are certified by an independent testing laboratory as meeting the requirements in paragraph 8.2.

Diamond Vogel
Dunn Edwards Mfg. Company
PPG Industries, Pittsburgh Paints
The Sherwin-Williams Company

PART 2 PRODUCTS

2.1 MATERIALS

A. Unless specifically approved as required under submittals paragraph in this Section, the paints shall be the first quality manufactured line and shall meet all requirements of this Specification and shall be manufactured by companies specified herein, or an acceptable substitution. Use only oils, thinners and driers as recommended by the paint products.

B. The paint must meet or exceed the following standards as determined by these test methods: Opacity (TT-P-141 #4121), Reflectance (TT-P-141 #6121), and Scrubbability (ASTM D2486-70).

| LATEX | SCRUB CYCLES | OPACITY | REFLECTANCE |
|---|---|---|---|
| Interior Flat | 350 | 0.975 | 89.0 |
| Interior Semi-Gloss | 800 | 0.978 | 89.0 |
| Exterior Flat | 550 | 0.966 | 89.0 |
| Exterior Semi-Gloss | 800 | 0.978 | 89.0 |
| ALKYD | | | |
| Interior Semi-Gloss | 1000 | 0.970 | 87.0 |
| Interior Gloss | 1000 | 0.970 | 89.0 |
| Exterior Semi-Gloss | 1000 | 0.970 | 87.0 |
| Exterior Gloss | 1000 | 0.970 | 89.0 |

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

B. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sandpaper smooth when dried.

1. When transparent finish is required, use spar varnish for backpriming.

C. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

1. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Hard glossy prime coats must be sanded to provide profile for finish coat.

3.2 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

3.3 APPLICATION OF TEXTURE FINISH

A. Finish Application. Mix and apply finish to drywall and other surfaces indicated to receive finish in strict accordance with manufacturer's instructions to produce a uniform texture without starved spots or other evidence of thin application, and free of application patterns.

B. Remove any texture dropping or overspray from door frames, windows and other adjoining work.

3.4 APPLICATION OF PAINT

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied. Do not paint in direct hot sun or when temperature of surface and material is below 40 decrees F. Allow each coat to dry at least 48 hours, unless time is specifically permitted by paint manufacturer, before application of succeeding coats. Remove accessories, plates, hardware, lighting fixtures and similar devices, or provide masking during painting operations. Finish work shall be uniform, proper color, free of runs, sags or flooding. For high gloss enamel finishes, lightly sand each undercoat. At completion, touch-up and restore damaged finishes or spots.

B. Assure that surfaces are properly prepared to receive paint. Application of paint shall constitute acceptance of surface condition by painter. Thin paints only as recommended by the manufacturer of the paint. Do not use solvents for thinning which have been previously used to clean brushes and equipment.

C. Minimal Coating Thickness: Apply each material at manufacturer's recommended spreading rate and sufficient to provide a total dry film thickness for the completed system of prime and finish coats of not less than 5.0 mil for 3-coat work and/or 3.5 mil for 2-coat work. Enamel shall be at least one mil thicker than prescribed above.

D. Methods: Use only paint methods appropriate for the particular painting application, use care to protect adjacent finishes from overspray, paint smears or other defacement.

E. Back priming: Required on all wood trim.

3.5 FIELD QUALITY CONTROL

A. Corrective Measures: As required by the Architect at no cost to the owner.

3.6 CLEAN-UP AND PROTECTION

A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finish surfaces.

C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and refinishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

D. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

E. At completion of work of other trades, touch-up and restore all damage or defaced painted surfaces.

3.7 PAINT SCHEDULE

A. INTERIOR SURFACES

1. Hollow Metal Doors and Frames (All Pre-Primed Metal to be cleaned with Low-Residue Solvent to remove Oils and other Contamination. Prime Metal, Finish with Alkyd Semi-Gloss Enamel):

   Two Coats: Sherwin Williams ProMar 200 Interior Alkyd Semi-Gloss.
   (Dry Mil Thickness not less than 1.5 mils per Coat)

2. Gypsum Board, Provide Interior Drywall Basecoat **Prior** to application of Decorative Texture (Level 5 Drywall Finish required).

   Prime Coat: Sherwin Williams ProMar 200 Zero Voc Interior Latex Primer. (Back rolling recommended). Applied at a Wet Mil Thickness of not less than 5.7 mils.

   Two Coats: Sherwin Williams ProMar 200 Interior Alkyd Semi-Gloss.
   (Dry Mil Thickness not less than 1.73 mils per Coat. NOTE: Second Coat is to be rolled).

3. Gypsum Board, Restrooms, Room 108 and 109. Provide Interior Drywall Basecoat **Prior** to application of Decorative Texture (Level 5 Drywall Finish require).

B. EXTERIOR SURFACES

1. Hollow Metal Doors and Frames (All Pre-Primed Metal to be cleaned with Low-Residue Solvent to remove Oils and other Contamination. Prime Metal, Finish with Alkyd Semi-Gloss)

   Two Coats: Sherwin Williams ProMar A100 Exterior Latex Flat.
   (Dry Mil Thickness not less than 1.5 mils per Coat)

2. Miscellaneous Steel, Pipe Ballards (Rust Inhibitive Primer. Finish with Alkyd Semi-Gloss)

   Two Coats: Sherwin Williams ProMar A100 Exterior Latex Flat.
   (Dry Mil Thickness not less than 1.5 mils per Coat)

END OF SECTION

SECTION 10 4400

FIRE EXTINGUISHERS

PART 1 GENERAL

1.1_ WORK INCLUDED

A. Portable hand fire extinguishers

1.2 SHOP DRAWINGS

A. Submit shop drawings in accordance with Section 01 3400.

B. Provide product cut sheets of extinguishers, hangers and cabinets.

C. Indicate extinguishers and cabinet types (including recess required), and installation locations.

1.3 PROTECTION

A. Protect cabinet finishes and adjacent surfaces and materials from damage or marring during installation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. J.L. Industries.

B. Larson’s Manufacturing Co.

C. Potter-Roemer.

D. Substitutions: Items of same function and performance are acceptable in conformance with Section 01 6300.

2.2 FIRE EXTINGUISHERS

A. Provide in all locations, unless noted otherwise.

B. Multi-Purpose Dry Chemical Type: Steel tank, with pressure gage, UL rating 2A-10B: C 10lbs. Larsen MP-10 with 546 mounting bracket. Mount 48” AFF.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify rough openings for cabinet are correctly sized and located.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install extinguishers cabinets plumb and level in wall openings so that top of extinguisher is 48 inches from finished floor. This shall be verified with Architect prior to setting units.

B. Secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

SECTION 11 4000

FOOD SERVICE EQUIPMENT

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Work Included: Furnish and install all food service equipment as specifically listed or described hereunder including but not necessarily limited to, stands, and supports for all equipment requiring them, all faucets, and drains, with tailpieces, cutting holes in equipment for pipes, electric outlets, etc., as required including welded sleeves, collars, ferrules, or escutcheons, all interwiring of equipment from control switches, panels, cut-offs, etc., where these items are part of equipment furnished, and all other related materials or accessories not shown or specified but necessary and reasonably implied from Drawings or accepted methods of construction. Removal and relocation of existing equipment or fixtures by Mechanical Contractor but coordinated with Food Service Contractor.

B. Work Not Included

1. Plumbing: All valves, traps, stops, grease traps, shut-offs, piping, extended condensate lines to floor sinks from appliances, etc., interconnected piping between steamer kettles or other materials required for final connections except where specifically requested by Food Service Equipment Contractor under item specifications.

2. Electrical: All line switches, safety cutouts, control panels, fuse boxes, wiring and final connections from rough-ins to equipment except where specifically requested by Food Service Equipment Contractor under item specifications.

C. Related Work Specified Elsewhere: Included and are part of this section: the general provisions of the contract, general and supplementary conditions and general requirements, as well as addendums, applying to the work specified in this section. Not included in this section, but it is the responsibility of the Contractor to coordinate with the following (all other trades working in the area) to insure accuracy and correct requirements are supplied and installed and line up with equipment to include:

| | | |
|---|---|---|
| 1. | Submittals: | Section 01340 |
| 2. | Rough Carpentry: | Section 06100 |
| 3. | Plumbing: | Division 15 - Mechanical |
| 4. | Mechanical: | Division 15 - Mechanical |
| 5. | Electrical: | Division 16 - Electrical |

1.2 QUALITY ASSURANCE

A. Codes and Standards: The work of this Section shall comply with the following codes and standards, including all current editions, revisions and supplements.

1. NFPA 70, National Electrical Code Chapter 1; Article 110 - Requirements for Electrical Installations, and Article 422 - Appliances

2. NFPA 89M, Manual on Clearances for Heat Producing Appliances.

3. NFPA 96, Standard for the Installation for Equipment for the Removal of Smoke and Grease - Laden Vapors from Commercial Cooking Equipment.

4. NSK Standard 2, Food Service Equipment.

5. NSF Standard 4, Commercial Cooking and Warming Equipment.

6. NSF Criteria C-2, Special Equipment and Devices.

7. Underwriter's Laboratories, Inc., UL 107, Safety Standards for Commercial Electrical Cooking Appliances.

8. International Conference of Building Officials, Uniform Building Code, Section 1714, Clearances for Electric Ranges and Hot Plates.

B. Rough-In and Shop Drawings:

1. Rough-In Drawings: Food Service Equipment Contractor shall check and verify service rough-in drawings and locations and furnish all equipment to meet these conditions. No extra charge will be allowed for changing of utility service to fit equipment during the installation and connection phase of the Project.

2. Shop Drawings: All food service equipment shop drawings shall be submitted at the same time and not piece-meal. Food Service Equipment Contractor is cautioned that he is responsible for checking and coordinating all shop drawings pertaining to his Work, for compliance with the contract Documents, dimensions, fit, and for coordination with other work and trades.

3. Coordination: General Contractor and Food Service Equipment Contractor shall coordinate installation of food service equipment with all other related trades. Prior to installing Work of this Section, General Contractor and Food Service Equipment Contractor will confirm locations, rough-in and connection of utilities for equipment specified for this Work and for relocation of existing equipment or fixtures.

4. Demonstration: Food Service Equipment Contractor shall demonstrate operation of all food service equipment to the Owner or Owner's representative(s) designated representative prior to final acceptance.

1.3 SUBMITTALS

A. Manufacturer's Literature: Submit copies of manufacturer's literature indicating components of specified materials, installation requirements, specifications and maintenance requirements for materials specified.

B. Shop Drawings: Submit shop drawings indicating dimensions, materials, details of construction, installation, and relation of adjoining work requiring cutting or close fitting including all required reinforcements, anchorage and related accessories. Shop drawings shall be drawn to an indicated scale, but not less than 3/4" to 1'-0" scale for plans and sections, details of special interest, connections and anchorage at not less than 3" to 1"-0" scale.

C. Operating and Maintenance Manuals: Upon completion of this portion of the Work, and as a condition of its acceptance submit operating and maintenance manuals of all equipment specified herein.

D. Materials List: Accompanying the shop drawings, submit copies of a complete list of all materials and equipment proposed to be furnished and installed under this portion of the Work, giving manufacturer's name, catalog number and catalog cut for each item where applicable telephone number of nearest authorized service representative.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to jobsite in a timely manner to ensure uninterrupted progress, Major pre-assembled components shall have a protective wrapping such as polyethylene or heavy kraft paper to protect factory finish. All other components shall be packaged and identified for ease in assembly. Promptly remove damaged materials from jobsite and immediately make all replacements necessary to satisfaction and approval of Architect and replace at Contractor's expense.

1.5 GUARANTEE/WARRANTY

A. Food Service Equipment Contractor shall guarantee all fixtures against defects in workmanship and material for one (1) year from date of substantial completion. Refrigeration work will be guaranteed to one (1) year from date of substantial completion and cover costs of parts, shipping and labor for this period. In addition, provide a five (5) year written guarantee on refrigeration compressors to cover cost of replacement parts only.

B. Food Service Equipment Contractor shall make suitable arrangements with local approved service and repair agencies for the servicing and maintenance of the equipment should malfunctions occur within one (1) year guarantee period. Upon completion of the installation and prior to the final payment, the Food Service Equipment Contractor shall furnish the Owner with a list of local agencies to be called in the event 2 malfunctions occur for all items supplied.

1.6 SUBSTITUTION OF EQUIPMENT & UNSPECIFIED PRODUCTS

A. (NO SUBSTITUTIONS WITHOUT PRIOR APPROVAL) Request for prior approval of substitutions must be submitted and received by the architect, seven (7) days prior to bid opening. The decision of the architect and/or the Owner relative to the acceptance of such proposals as being equal shall be final. The Contractor, Sub-Contractor, Supplier is responsible to meet specifications and utility connections and is responsible for all cost related to changes made in specifications to meet substitutions. If later found that substitutions do not meet specifications, it will be the Contractor, Sub-Contractor, or Supplier's responsibility to remove and replace with the specified item at no cost to the Architect or Owner.

PART 2 PRODUCTS

2.1 FOOD SERVICE EQUIPMENT

The following is a list showing Food Service Equipment and related items to be installed into the Food Service Operation Kitchen, Serving Area, Warewashing Area, General Storage and Handling Areas.

A. Related items are listed only for reference and are not proposed to be in food service equipment contractors contract to supply and/or install. These are noted as provided by Owner.

B. For information and specifications on related items refer to sheet A3.

C. Definitions for the following food service equipment list:

All items shown are to be furnished by the Kitchen Equipment Contractor (K.E.C.) unless noted otherwise.

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1 ea **DISHTABLE, SOILED "L" SHAPED**
Advance Tabco Model No. DTS-K70-96R
Korner-Soil Dishtable, L-shaped, attaches to right of dish machine operator, 10-1/2"H backsplash, with pre-rinse sink, stainless steel legs, with crossrails, 95" long, 16/304 stainless steel

1 ea SPECIFY DISH MACHINE BRAND & MODEL to ensure proper fit, refer to attached document (AQ only) or consult www.advancetabco.com for compatibility listing. Certain dish machines require modifications at additional cost not shown here

1 ea K-495 Turn Down Backsplash (includes wall clips)

1 ea DTA-100 Pre-Rinse Basket with Slide Bar, for 20"W x 20"D fabricated sink bowls

1 ea DTA-76 Move pre-rinse sink to conform to dish machine requirements, specify dish machine (see compatibility chart for more information)

1 ea K-461 Install collar, with 8" x 12" control bracket

1 ea K-453 Control Bracket, 14" x 16" (each)

1 ea K-37 Anti-Siphon vacuum breaker holes

1 ea DTA-53 Pre-Rinse Faucet, 8" OC splash-mounted, includes: spray valve & hose, riser, wall bracket, heavy duty hose spring, lead free

1 ea DTA-84 Simple Pass Thru

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Advance Tabco Model No. DTC-S70-48L-X
Special Value Dishtable, clean, straight design, attaches to left of dish machine operator, 10-1/2"H backsplash, 3" rolled front & side rims, stainless steel legs, with crossrails, 47"W x 30"D x 34"H, 16/304 stainless steel

1 ea SPECIFY DISH MACHINE BRAND & MODEL to ensure proper fit, refer to attached document (AQ only) or consult www.advancetabco.com for compatibility listing. Certain dish machines require modifications at additional cost not shown here

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32 1 ea **TWO (2) COMPARTMENT SINK**
Advance Tabco Model No. FC-2-1824-24R-X

Special Value Fabricated Sink, 2-compartment, 24" right drainboard, bowl size 18" x 24" x 14" deep, 16 gauge 304 stainless steel, tile edge splash, rolled edge, 8" OC faucet holes, stainless steel legs with adjustable side cross-bracing, 1" adjustable stainless steel bullet feet, overall 29-1/2" F/B x 62-1/2" L/R, NSF

1 ea 12" spout

1 ea K-1 Faucet, splash mounted, 8" OC, 12" spout

2 ea K-5 Drain, twist operated, 2" NPT & 1-1/2" IPS outlet connections

2 ea K-4 Support Bracket, for lever waste drain handle, (1) support required for each lever drain

## PART 3 EXECUTION

### 3.1 GENERAL

A. Upon notification of award and letter to proceed, coordinate with the General Contractor, comply with contractual specifications as set forth in the general conditions. Supplementary requirements as well as Part I and Part II of this section. Establish a one on one working relationship with the General Contractor's representative and all related trade representatives. Establishing procedures and flow between this sub-contractor, contractor and architect. Establish a schedule insuring the project will be on schedule and insure all submittals, clarifications, and discrepancies are handled immediately and according to the contract.

B. Failure to coordinate and maintain a schedule can be cause for damage such as back charges for delay of project, liquidated damages and other added cost to contractor's expenses for performing work tjos sub-contractor is responsible for.

### 3.2 DELIVERY OF MATERIALS & EQUIPMENT

A. Coordinate all deliveries of materials and equipment to job site with general contractor. It is this Contractor's responsibility to have required labor and all required equipment to receive and handle materials and equipment at the job site. It is the Contractor's responsibility to protect all his equipment and work by providing protective covering to protect equipment and work. Coordinate location to store equipment with General Contractor/Owners representative.

### 3.3 INSTALLATION

Install all specified equipment and components in strict accordance with the approved submittals and shop drawings and manufacturer's recommended methods of installation. Coordinate final hookups and interconnections with all required trades (plumbing, electrical, etc.). Firmly anchoring all components in place for safety and long life under hard usage.

A. Cutting and Fitting: Food service equipment contractor shall perform all cutting and fitting as required on food service equipment to make the work fit. Perform no cutting, notching, drilling or altering of any kind to the equipment to work of other trades without prior approval and coordinating with other trades and General Contractor.

B. Welding and Soldering: Materials shown as continuous shall be welded. Seams and joints shall be shop welded or soldered as the nature of material may require. Welds shall

be ground smooth and polished to match the original finish. Where galvanizing has been burning off, the weld shall be cleaned and touched up with high-grade aluminum paint.

C. Cleaning: Clean-up is the Contractor's responsibility to keep their areas of work clean. Remove all their trash daily.

D. Trimming and Sealing Equipment: Any space between units and walls, ceiling, floors, and adjoining unit (not portable) shall be completely sealed against entrance of food particles or vermin. By means of trim strips, welding, soldering, or commercial (sealer) joint material suitable to the nature of the equipment.

1. Sealer when not exposed to extreme heat shall be mildew resistive silicone sealant in appropriate color. Ends of hollow sections shall be closed. Enclosed fixtures without legs mounted on floor shall be sealed water right to floor. NOTE: Do not seal until work behind has been completed by all trades.

2. Do not use sealer/caulking on gaps larger than 1/4". All gaps larger than 1/4" shall be trimmed with matching material.

3.4 INSPECTIONS

A. Prior to any and all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that food service equipment can be installed in accordance with original design and manufacturer's recommendations, rough-ins, and shop drawings.

B. Inspections of Work: (Pre-inspections) - The General Contractor and the Architect will periodically inspect the work. Deficiencies will be brought to the attention of the Food Service Equipment Contractor for correction before final inspection. Failure to correct noted deficiencies in a timely manor and/or final inspection may be corrected by the General Contractor and charged back to the Food Service Equipment Contractor.

C. Discrepancies and Clarifications: (Of Others Work) - In the event of a discrepancy, immediately notify the General Contractor and the Architect. Do not proceed with the installation in those areas of discrepancy until all such discrepancies have been fully resolved.

D. Testing and Operating Instructions: After all utility connections to the equipment are made by other contractors, the Food Service Equipment Contractor shall conduct the final test of equipment in the presence of the Owner or his authorized representative. After the Owner has taken occupancy and has used the walk-in cooler for ten days the Food Service contractor shall re-calibrate the settings to insure proper operation.

E. Final Inspection: Prior to acceptance - Walk-through with the Owner and Architect (discrepancies will be noted for corrections.)

F. Demonstration and Instruction: Food Service Equipment Contractor shall demonstrate operation of all equipment to the Owner and instruct the proper use and maintenance of all food service equipment. Provide one (1) day instruction by a qualified instructor, Include review of operating and maintenance manual to the Owner.

3.5 PROJECT FINAL REQUIREMENTS

The following must be supplied to the Architect before final acceptance.

A. Project Records, Documents, Keys, Manuals: As built drawings, records and details.

B. Warranty: Provide all warranties filled out and ready to be mailed to manufacturer.

C. Provide list of all equipment supplied listing all serial numbers, model numbers with local authorized service agencies and phone numbers. A copy of this list will also be inserted in the front of the operation and maintenance manual binder.

D. Operation and Maintenance Manuals (O & M): Will be supplied to Owner or Owner's representative on all equipment supplied (including keys).

END OF SECTION

DIVISION 15

MECHANICAL

PART 1 GENERAL

1.01 SCOPE OF WORK.

A. The following requirements are in addition to those detailed under General Conditions and Supplemental Conditions.

15010 General Mechanical Requirements.
15020 Basic Material and Methods
15100 Valves and Piping Specialties
15180 Mechanical Systems Insulation
15420 Water Supply System
15430 Soil and Waste System
15450 Plumbing Fixtures and Trim
15600 Natural Gas System
15800 Air Conditioning and Ventilating
15900 Building HVAC Controls and Instruments
15910 Electrical System Controls

B. The General Provisions and other contract requirements in the Table of Contents apply to each section herein.

1.02 GUARANTEE-WARRANTY

The following guarantee is a part of the specifications and shall be binding on the Contractor.

AThe Contractor guarantees that this installation is free from mechanical defects. He agrees to replace or repair to the satisfaction of the Architect any part of the installation which may fail within a period of one year after the date of acceptance, provided that such failure is due to defects in materials or workmanship or to failure to follow the specifications and drawings. If repair or replacement is required during the warrantee period, the warrantee period will extend

to one year beyond the completion of the repair or replacement for the material or equipment involved.

1.03 SHOP DRAWINGS

As soon as possible after the Contract is awarded, the Contractor shall submit to the Architect eight copies of data describing all equipment to be furnished. Complete data must be furnished showing performance, quality, and dimensions. Written approval of the Architect must be obtained before purchasing any equipment. All submittals shall follow submittal procedures defined in Division 1.

Data must be furnished showing performance, quality, and dimensions. Written approval must be obtained before purchasing any equipment. All items shall be CLEARLY MARKED AS TO PLAN IDENTIFICATION CODE.

1.04 SUBSTITUTIONS

A. Whenever a material, article or piece of equipment is identified on the drawings or in the specifications by reference to the manufacturer's or vendor's name, trade name, catalog number or the like, it is so identified for the purpose of establishing a standard, and any material, article, or piece of equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, or piece of equipment proposed is, in the opinion of the Architect, of equal substance, appearance and function. It shall not be purchased or installed by the Contractor without the Architect's written approval. The bidder is required to submit substitution request to the Architect at least (10) days prior to bid opening date. Approval of Substitutions shall be duly noted to each bidder at least two (2) days before bid opening date by an addendum prepared by the Architect.

B. Approval of substitutions shall not relieve the Contractor from the responsibility for compliance with all requirements of the Contract documents. The Contractor shall be responsible at his own expense for any changes in other parts of his own work or the work of other Contractors which may be caused by substitutions.

## 1.05 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 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 accurate location of all openings.

B. Where the work will be installed in close proximity with the work of other trades, the Contractor shall coordinate his work with the other trades. If the Contractor installs his work before coordinating with other trades, he shall make necessary changes in his work to correct the condition without extra charge. The Contractor shall obtain rough-in information from the suppliers so that necessary sleeves, knockouts, etc., can be set without delaying construction.

## 1.06 DRAWINGS

A. The mechanical drawings show the general arrangement of all piping, ductwork, equipment, etc., and shall be followed as closely as actual building construction and work of other trades will permit. The Architectural and Structural drawings shall be considered as a part of the work insofar as these drawings furnish the Contractor with information relating to design and construction of the building. Architectural drawings shall take precedence over mechanical drawings. Because of the small scale of the mechanical 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, traps, valve, and accessories as may be required to meet such conditions. Should conditions necessitate a rearrangement of piping or ductwork, such departures and the reason therefor shall be submitted by the Contractor to the Architect for approval in the form of detail drawing showing the proposed changes. No such changes shall be made without the prior written approval of the Architect. The Contractor shall be responsible for work shown on other sections of drawings, such as plumbing shown on Civil or Mechanical drawings. The Contractor shall be responsible for coordinating with the electrical drawings and specifications. Any discrepancies in

the drawings shall be brought to the attention of the Architect at least (10) days prior to the bid date.

B. Field Measurements: The Contractor shall verify the dimensions governing his work at the building. No extra compensation shall be claimed or allowed on account of differences between actual dimensions and those indicated on the drawings. He shall examine adjoining work, on which his work is dependent for perfect efficiency, and shall report any work which must be corrected. No waiver of responsibility for defective work shall be claimed or allowed, due to failure to report in writing unfavorable conditions affecting his work.

## 1.07 CODES AND PERMITS

A. Codes and Ordinances: The mechanical work shall be performed in strict accordance with the applicable provisions of the Standard Pluming Code of the State of New Mexico. All materials and labor necessary to comply with rules, regulations and ordinances shall be provided. Where drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern. The Contractor shall hold harmless and save the owner free and harmless from liability of any nature of kind arising from his failure to comply with codes and ordinances.

B. Permits, Fees, and Inspections: Permits necessary for the prosecution of the work under the contract shall be secured and paid for by the Contractor. Final inspections by the Architect will not be made or certificate of final payment issued until certificates of satisfactory inspection from the inspection authorities are delivered

## 1.08 ELECTRICAL SERVICES

A. Motors: provide and install all motors as manufactured by General Electric, Allis Chalmers, Louis Allis, reliance, US, Lincoln, Westinghouse, or approved equal. Each motor shall be designed for the electrical characteristics listed on the drawings and, unless otherwise specified, shall be squirrel cage, normal starting

torque and normal starting current, in accordance with NEMA standards. Motors shall be provided with double sealed leakproof bearings with grease fittings and relief fittings. Motors shall be commercially dynamically balanced and tested at the factory before shipment and shall be selected for quiet operation. Motors for V-belt drives shall be provided with a slide base and adjustable screw devise. The Contractor shall line up motors and drives and places motors and equipment on foundations ready for operation.

B. Electrical Wiring and Control Equipment: Motor starters and power wiring indicated on the electrical drawings, except items otherwise specifically noted, will be furnished and installed under Division 16. All control wiring for plumbing, heating, ventilating and air conditioning equipment including interlocks with other mechanical equipment shall be furnished and installed under the Mechanical Division unless these controls carry the full load current to the mechanical equipment, in which case they shall be installed and connected under the Electrical Division. Refer to drawings and specifications under the Electrical Division for further coordination and division of the work. Refer to section 15910, electrical System Controls, for coordination between Mechanical and Electrical work. Any changes or additions required by specific equipment furnished shall be the complete responsibility of the Contractor furnishing the equipment.

## 1.09 CUTTING AND PATCHING

Mechanical work shall be laid out in advance of building construction to permit building in pipe sleeves, inserts, hangers, supports, fixture carriers, etc., to eliminate unnecessary cutting of structural members. Where cutting becomes necessary, the Contractor shall employ the trade installing the work originally to restore such cut work and close openings communicating from one compartment to another at no expense to the Owner. Cutting the work of other trades shall not be done without the consent of the Architect. No structural member shall be cut without the written consent of the Architect.

## 1.10 TRENCHING AND BACKFILLING

All excavation, trenching and backfilling required for the mechanical installation shall be provided by the Contractor. Excavation and backfilling shall be done in strict accordance with OSHA requirements. Bottoms of trenches shall be tamped hard, and for soil and waste piping shall be graded to secure uniform fall of 1/4 inch per foot unless otherwise noted. Dell holes for sewer pipe shall be excavated so pipe will rest on solid ground for its entire length. Sewer and water pipes, when in close proximity, shall be installed in accordance with the Arizona State Plumbing Code. After pipe lines have been tested, inspected and approved by the Architect and Plumbing Inspector, and prior to backfilling, the excavation shall be leaned of all kinds of rubbish and backfill material shall be cleaned free of trash. Place and compact backfill in compliance with the requirements of Section AEarthwork.

## 1.11 RECORD DRAWINGS

Submit record drawings at 1/8" = 1'-0" scale or ¼" = 1'-0" scale, in sepia from to the Architect showing any revisions to ductwork or piping.

## 1.12 PAINTING

Mechanical equipment shall be factory painted.

# PART 2 PRODUCTS

## 2.01 ALTITUDE RATINGS

Unless otherwise noted, all specified equipment capacities are for an altitude of 5500 feet above sea level and adjustments to manufacturer's ratings must be made accordingly.

2.02 QUALITY OF MATERIALS

Unless otherwise noted on drawings, all equipment and materials shown shall be new, and shall be the standard product of manufacturer's regularly engaged in the production of plumbing, heating, ventilating and air conditioning equipment and shall be the manufacturer's latest design.

2.03 EQUIPMENT SCHEDULE

All major items of equipment are specified in the equipment schedule on the drawings or in the specifications and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory installation.

PART 3 EXECUTION

3.01 PROTECTION OF MATERIALS

Pipe openings shall be closed with caps or plugs to prevent lodgement of dirt or trash during the course of installation. Plumbing fixtures shall not be used by the construction forces. At the completion of the work, fixtures, equipment and materials shall be cleaned and polished thoroughly and delivered in a condition satisfactory to the Architect. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.

3.02 MANUFACTURER'S DIRECTIONS

The Contractor shall install all equipment in strict accordance with all directions and recommendations furnished by the Manufacturer. Where such directions are in conflict with

the plans and specifications, the Contractor shall report such conflicts to the Architect who shall make such compromises as deemed necessary and desirable.

## 3.03 TESTING AND BALANCING OF THE MECHANICAL SYSTEMS

A. Testing and balancing of the mechanical systems shall be under the direction and coordination of the Contractor, who shall be totally responsible to furnish the data required by the test procedure outlined below. The actual testing and balancing procedure shall be executed by an independent testing and balancing service, whose services shall be procured and paid for by the Contractor.

B. Prior to the commencement of the testing and balancing procedures, the Contractor shall request a mechanical inspection of the project. The inspection shall be conducted by a duly appointed representative of the Architect's office, the Contractor's superintendent, and a representative of the testing and balancing firm. The inspection shall establish to the satisfaction of all parties that the systems are ready for testing and balancing.

C. The testing and balancing subcontractor shall provide the necessary calibrated equipment for testing and balancing purposes.

D. The duct system shall be tested as follows:

The total air volume handled by the system shall be determined by means of a pitot tube and draft gauge. The average velocity in the duct shall be determined by velocity readings which are taken in the center of equally divided areas in the cross section of the duct. The number of areas in a duct in which velocity readings are to be taken is determined by the size of the duct, based on the maximum size of equally divided areas being 8 inches. The total air delivered by each duct shall be measured by pitot tube traverses. The volume dampers, pressure controllers, outlets, and other devices, shall be adjusted so the air volumes will be as shown on the drawings. On completion of the test, the Contractor shall submit four copies of a typewritten report showing the tested values. The CFM of each outlet with corresponding room number shall be included. This report shall include the fan RPM, nameplate data, the voltage and ampere reading of the fan motors and the fan suction and discharge static pressure. Air volumes shall be tested to within 5 percent of the quantities indicated on the drawings for individual air outlets. If the tested air quantities are not within the required limits, the Contractor must replace fan pulleys, etc., as required to meet the specifications.

E. A copy of the final report on testing and balancing shall be included in the Operating Manuals prepared by the Contractor.

3.04 TEMPORARY SERVICES

The Contractor shall furnish and install all temporary plumbing facilities and system required for construction. The Owner's existing plumbing facilities may not be used for this purpose unless approved by the Owner's representative.

3.05 SPECIAL OPENINGS

The Contractor shall attempt to schedule delivering of all large equipment requiring special openings for installation prior to enclosing of the area. Where this is not possible, written notice of required openings which must be provided shall be listed by size and location and submitted to the Architect prior to enclosing of the areas involved.

*******

## PART 1 GENERAL

### 1.01 REQUIREMENTS

A. See section 15010, General Mechanical Requirements.
B. The General Provisions and other contract requirements in the Table of contents apply to each section herein.

## PART 2 PRODUCTS

### 2.01 V-BELT DRIVES

V-belt drives shall be of fabric and rubber construction of an approved manufacturer. Multiple belts shall be matched and all belts shall be adjusted to drive the apparatus properly and to prevent slippage and undue wear in starting. Drives shall be designed for 150 percent of the specified nameplate rating. All belts shall be fully enclosed with belt guards.

### 2.02 REDUCERS

Reductions in the pipe sizes shall be made with one-piece reducing fittings. Bushings will be acceptable only when one-piece reducing fittings of the proper size are not obtainable or there is no room for reducing couplings or swagged nipples. Pipe entering bushings or one step reduction shall have long threads cut on them so that the pipe extends for a distance of at least two threads into the parent fitting.

### 2.03 VIBRATION ISOLATION

The drawings indicate equipment to be provided with vibration isolation. All new rotating and vibrating equipment shall be provided with vibration isolating supports and vibration isolation, as shown or required by the equipment manufacturer.

## PART 3 EXECUTION

### 3.01 PIPING INSTALLATION

A. General: Provide and erect in a workmanlike manner, according to the best practices of the trade, all piping shown on the drawings and required for the complete installation of these systems. The piping shown on the drawings shall be considered as diagrammatic for clearances in indicating the general run and connections, and

may not show all parts in the true position. The piping may have to be offset, lowered or raised as required or as directed at the site. This does not relieve the Contractor from responsibility for the proper erection of systems or piping in every respect suitable for the work intended as described in the specifications and approved by the Architect. In the erection of all piping, it shall be properly supported and proper provisions shall be made for expansion, contraction and anchoring of piping. All piping shall be accurately cut for fabrication to measurements established by field measurements. Springing and/or forcing to properly clear all windows, doors and other openings and equipment will not be permitted. Cutting or other weakening of the building structure to facilitate installation will not be permitted. All pipes shall have burrs, and/or cutting slag removed by reaming or other cleaning methods. All changes in direction shall be made with fittings. All open ends of pipes and equipment shall be properly capped or plugged to keep dirt and other foreign materials out of the system. Plugs of rags, wool, cotton waste, or similar materials may not be used in plugging. All piping shall be arranged so as not to interfere with removal and maintenance of equipment, filters, or devises; and so not to block access openings, etc. Flanges or unions as applicable for the type of piping specified shall be provided in the piping at connections to all items of equipment. All piping shall be so installed as to insure noiseless circulation. All valves and specialties shall be so placed to permit easy operation and access, and all valves shall be regulated, packed and adjusted at the completions of the work before final acceptance. All piping shall be erected to insure proper draining. Pitch piping down in the direction of flow or to drains with a grade of not less than 1" in 40 feet.

B. Joints:

1. Screwed joints shall have American Standard Taper pipe threads. Ream pipe ends and remove burrs after threading. Make up joints using teflon tape or other approved compound, applied to the male thread only.

2. Solder joints: Tubing shall be cut square and burrs removed. Both inside of fitting and outside of tubing shall be well cleaned with steel wool before sweating. Care shall be taken to prevent annealing of fittings and hard drawn tubing when making connections. Joints for sweated fittings shall be made with a non-corrosive paste flux and solid wire solder. Use 50-50 solder on piping 2" and smaller and 95-5 solder on piping over 2". Cored solder will not be permitted.

3. Welded Joints: Joints on black steel pipe may be welded. Welding shall be down using either gas or electric welding equipment. Certified welders shall be used. All pipe surfaces shall be thoroughly cleaned before welding. Piping shall be securely aligned and spaced, and the width of circumferential welds shall form a gradual increase in thickness from the outside to the center of the weld. All fittings used on welded piping systems shall be standard ASA fittings, and shall be of standard pipe thickness. The Contractor shall provide

a mat or blanket to protect the structure and adequate fire protection at all locations where welding is done. All elbows shall be long radius. Wherever tee connections are made to piping systems on the main run, welding sockets (Weldolets, Threadolets, Sockolets, or approved equal) shall be installed for the branch connections up to one size smaller than the main run. Welders shall be certified in accordance with Sections IX of ASME Boiler and Pressure Vessel Code, 1965 Edition.

4. No Hub Joints: hubless piping shall be joined with a stainless steel retaining clamp manufactured specifically for use in hubless cast iron sanitary systems and shall comply with standards issued by the Cast Iron Soil Pipe Institute. Sealing gaskets shall be fabricated from high quality vulcanized elastomeric compound containing DuPont Neoprene or approved equal as the sole elastomer.

5. Compression Gasket Joints: Compression gasket joints shall be made utilizing preformed gaskets in hub and plain-end cast iron soil pipe and fittings. Gaskets shall be molded to the contours and shape required for the make and weight of pipe used and shall be fabricated from a high quality elastomeric compound containing DuPont Neoprene or approved equal as the sole elastomer and shall be vulcanized into a dense homogeneous product that is free of porosity, blisters and other imperfections

6. Insulating fittings shall be used to connect dissimilar metals (such as steel and copper) to prevent electrolytic action.

B. Pipe Sleeves: Pipe Sleeves or thermal hanger shields by Pipe Shields, Inc., InsulShield, Unigrip, or approved equal shall be furnished and set by the Contractor and he shall be responsible for their proper and permanent location. Piping will not be permitted to pass though fittings, caissons, tee stems, or beams except with written consent of the Architect. Pipe sleeves or thermal hanger shields shall be Pipe Shields, Inc., InsulShield, UniGrip, or approved equal and shall be installed and properly secured in place at all points where pipes pass through concrete or masonry construction. Pipe sleeves shall be 24 gauge galvanized steel, and shall be of sufficient diameter to provide approximately 1/4" clearance around the pipe, and in cases of insulated pipes, approximately 1/4" around the insulation. Pipe sleeves in floors shall extend 2 inches above finished floor in toilets or rooms where domestic water is used. Openings between piping and sleeves shall be made watertight with plastic cement to a minimum depth of 2 inches. In addition, openings between piping and sleeves in all masonry, concrete interior walls, or gyp-board fire walls and partitions or sound partitions, shall be tightly sealed to prevent gases from passing through the pipe sleeves in the event of fire. Where pipes pass through exterior wall,

the annular space between the wall and the pipe shall be sealed with sealing elements made of synthetic rubber, pressure plates, and cadmium plated bolts equal to Link-Seal LS-300 up to 10 inches pipe diameter. Pipe sleeves shall be one pipe size larger than carrier lines. All wall penetrations thru metal buildings shall be compatible with metal building construction.

C. Floor, Wall and Ceiling Plates: Where uncovered, exposed pipes passing through floors, finished walls or finished ceilings, shall be fitting with chromium plated spun brass escutcheons. Plates shall be large enough to completely close the hole around the pipe, and shall be not less than 1-1/2 inch or mor the 2-1/2" inch larger than the diameter of the pipes. All plates shall be securely held in place.

D. Unions: Unions on piping 2 inch and smaller shall be ground joint unions with brass-to-iron seats. Piping 2-1/2 inch and larger shall have bolted flange unions with gaskets of material suitable for the specified service or companion flanges. Unions shall be installed at all valves and equipment connections.

E. Hangers and Anchors: All piping shall be rigidly supported from the building structure by means of adjustable ring or clevis type hangers. Where pipes run side by side, support on rod and angle iron trapeze hangers. Round rods supporting the pipe hangers shall be of the following dimensions:

| | |
|---|---|
| 1/2" to 2" pipe | 3/8" rod |
| 2-1/2" to 3" pipe | 1/2" rod |

Rods for trapeze hangers shall be a minimum of 3/8" or shall have equivalent cross section listed above per pipe supported. The use of pipe hooks, chains, or perforated iron straps for pipe supports will not be permitted. Protection sleeves shall be used on insulated piping that requires a vapor barrier such as cold water piping. Where concrete inserts cannot be used, expansion shields may be used provided the hanger is not attached rigidly to the bolt but is supported from an angle held in place by the expansion bolt. Hangers constructed of different materials than the piping supported where electrolysis can occur, shall be isolated from the piping. All vertical piping of copper or steel to be supported at every floor and shall have hangers at each pipe joint and each fitting. Hanger spacing shall be as follows:

| Steel Piping | Maximum Spacing |
|---|---|
| 1" and smaller | 7'-0" |
| 1-1/4" thru 4" | 10'-0" |
| Copper Piping | |

| | |
|---|---|
| 3/4" and smaller | 6'-0" |
| 1" thru 1-1/2" | 8'-0" |
| 2" thru 4" | 10'-0" |
| Waste Piping | |
| 1-1/4" thru 2" | 3'-0" |
| 3" and larger | 5'-0" |
| Vent Piping | |
| 1-1/4" thru 2" | 6'-0" |
| 3" | 7'-0" |
| 4" | 8'-0" |

F. Equipment Connection: All piping connecting to equipment shall be installed without strain at the pipe connection of this equipment. The Contractor shall be required, if so directed, to disconnect piping to demonstrate that the piping has been so connected.

G. Access to Valves and Dampers: Access doors not less the 24" X 24" and shall be Krueger Style CE or Style d or approved equal as required, shall be furnished and installed to provide easy access to all concealed valves, or automatic dampers not otherwise accessible. Fire ratings of access doors shall be the same as the barrier on which they are mounted.

H. Expansion and Contraction: The Contractor shall make all necessary provisions for expansion and contraction of branch piping with offsets or loops as shown to prevent undue strain.

I. Protective Coatings: All underground steel pipe shall be wrapped with "Scotchwrap" No. 50 tape or approved equal to give not less than two complete layers on the entire underground piping system, or piping shall have X-Tru Coat factory applied plastic protective covering or approved equal.

J. Cross-Connections: No pluming fixture, devise or piping shall be installed which will provide a cross-connection or inter-connection between a distributing water supply such as a drainage system or soil or waste pipe which will permit or make possible the backflow of sewage, polluted water, or waste into the water supply system.

3.02 OPERATION AND MAINTENANCE INSTRUCTIONS

The Contractor shall furnish the Owner complete operating and maintenance instructions covering all units of mechanical equipment herein specified, together with parts lists. All literature shall be furnished in duplicate and shall be suitably bound in book form. A "Lubrication Chart" 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 each equipment room.

3.03 FLUSHING, DRAINING AND CLEANING PIPE AND CUT SYSTEMS.

The Contractor shall flush out all water system with water before placing them in operation. Debris shall be removed from duct systems and fans shall be run to blow out duct and foreign matter before final connections are made to diffusers and outlets.

3.04 LUBRICATION

The Contractor shall provide all oil for the operation of all equipment until acceptance. The Contractor shall be held responsible for all damage to bearings while the equipment is being operated by him up to the date of acceptance of the equipment. The Contractor shall protect all bearings and shafts during installation and shall thoroughly grease the steel shafts to prevent corrosion. All motors and other equipment shall be provided with covers as required for proper protection during construction.

PART 4 IDENTIFICATION.

4.01 IDENTIFICATION TAGS AND LABELS

A. Pipe Labels: Pipe labels shall be self-adhesive labels, all temperature Perma-Code pipe markers No. B-500, manufactured by the WH Brady Company or approved equal. The background color code for all markers shall conform to the American National Standard ANSI A-13.1956, "Scheme for the Identification of Piping Systems". This standard establishes four backgrounds as follows: Yellow for dangerous materials, bright blue for protective materials, green for safe materials, and red for fire protection.
B. Tags: Tags shall be aluminum, brass or laminated plastic 2" x 1" minimum size with edge ground smooth or rolled. Each tag shall be evenly spaced and stamped or engraved into the surface. Tag all valves.

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PART 1 GENERAL

1.01 COPE OF WORK

See Section 15010, General Mechanical Requirements.
See Supplemental Conditions and General Requirements.
The General Provisions and other contract requirements in the Table of Contents apply to this section.

PART 2 PRODUCTS

2.01 VALVES

A. Valves shall be as manufactured by Crane, Jenkins, Demco, Kennedy, Stockham, Hammond, Nibco, Consolidated, Mission, Apco, Walworth, Powell, or approved equal, and equal to those specified below. Unless otherwise noted, valves shall have a working pressure of 125 psi, and listed for the applicable service.

B. Gate Valves 2" and Under: Crane 428 or 465 1/2, or equal, rising stem, wedge disc, bronze body, 125 psi, brass screwed, Teflon seats and seals, stainless ball.

C. Gate Valves above 2": Crane no. 465 1/2, bronze trimmed, wedge disc, iron body, O.S. & Y., 125 psi working pressure.

D. Swing Check: 2" and smaller - Crane 37 or equal. Larger than 2" - Crane 373 or equal. All bronze, regrinding, 125 psi.

E. Silent Check Valve: Apco 500 Series or equal, designed for tight shut-off with flanged ductile iron body, bronze trim, and resilient seating, 125 psi by Williams-Hager, or equal.

F. Globe Valve: 2" and smaller - Crane No. 1 or 2 or equal. Larger than 2" - Crane 359 or equal. Bronze body with renewable disc, 125 psi.

G. Balancing Cocks: 2" and smaller - Crane No. 250 or equal. Larger than 2" - Nordstrom No. 143 or equal. Square head brass cock, or ball valve.

H. Strainers: Crane No. 989 2 or equal, with blow-off valve, 20 mesh screen for water or 40 mesh screen for steam.

I. Pressure Gage: Trerice Series 500 or equal, with 4-1/2" dial, 300 Series hole, valve for gage cock, 0-60 psi range. Provide Crane No. 88 or equal needle valve for each gage.

J. Thermometer: Wiess Vari-angle or equal, with 9" case, 3-1/2" insertion element, separable socket and well (length as required for accurate reading), 0-240 deg f.

K. Manual Air Valves: Crane No. 712 or equal, 1/2" brass ball valves.

L. Temperature and Pressure test Plugs: Nordel valve core, 1/2" NPT brass body complete with gasket cap. Plugs equal to #45PT-N.

M. Water Pressure relief valve for make-up to heating systems and relief for heating systems shall be equal to Bell & Gosset No. 480-75. Relief valves for heating systems shall be sized for the full heating capacity

N. Drain Valves: 2" and smaller - Crane No. 440 or equal. Larger than 2" - Crane No. 430 or equal.

2.02 SPECIALTIES

Welded Fittings: All welded fittings used in the welded system shall be manufactured by Tube Turns, Inc., Taylor Forge and Pipe Works, Midwest Piping and Supply Co., or Bonney Forge and Tool Works for AWeld-O-Let@ or AThread-O-Let@, or equal and shall match the pipe in which they are installed. Welding fittings shall conform to ASA Standards.

PART 3 EXECUTION

3.01 INSTALLATION

All specialties shall be installed in accordance with the best standard practices and as recommended by the Manufacturer.

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PART 1 GENERAL

1.01 SCOPE OF WORK

A. See Section 15010, General Mechanical Requirements.

B. See Supplemental Conditions and General Requirements for substitutions.

C. Pipe coverings for domestic hot water piping and domestic cold water piping including pipe, fittings, flanges and valves.

D. Ducts.

E. The General Provisions and other contract requirements in the Table of Contents apply to this section.

1.02 RELATED WORK IN OTHER SECTIONS.

Air Conditioning and Ventilating, Section 15800

PART 2 PRODUCTS

2.01 INSULATION.

Insulation shall be as manufactured by Owens Corning Fiberglas, Phillip Carey, Johns-Manville, or approved equal and shall be equal to that specified. All insulating materials shall have a composite (insulation, jacket, and adhesive) fire and smoke hazard rating not exceeding: Flame Spread - 25; Smoke Developed - 50. All accessories and materials used for fittings shall have the same ratings. Information must be submitted to the Architect by means of Manufacturer's literature showing that the materials conform to the above specifications without exception.

A. Fiberglas Pipe Insulation: ASTM C547, class 1.

B. Cellular Glass Pipe Insulation: ASTM C552, Type II, Class 2.

C. Jackets for Piping Insulation: ASTM C921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient. Type I may be used for all piping at Contractor's option.

1. Encase pipe fittings insulation with one-piece premolded PVC fitting covers, fastened as per manufacturer's recommendations.

2. Encase exterior piping insulation with aluminum jacket with weather proof construction.

D. Rigid Fiberglas Ductwork Insulation: ASTM C612, Class 1.

E. Flexible Fiberglas Ductwork Insulation: ASTM C553, Type I, Class B-4.

F. Jackets for Ductwork Insulation: ASTM C921, Type I for ductwork with temperatures below ambient; Type II for ductwork with temperatures above ambient.

G. Duct Liner: Fibrous glass complying with Thermal Insulation Manufacturer's Association (TIMA) AHC-101.

PART 3 EXECUTION

3.01 DOMESTIC HOT WATER PIPING.

Hot water lines shall be insulated with 1" thickness Johns-Manville Flame-Safe AP-T or approved equal on exposed and concealed piping. All fittings except unions, shall be covered with insulating cement of the same thickness as the pipe covering.

3.02 DOMESTIC COLD WATER PIPING

Domestic cold water piping and fittings shall be insulated with 1" thickness AP-T or approved equal sectional insulation. Vapor barrier jacket shall be completely sealed. Cover all fittings except unions same as Paragraph 3.01. Only insulate cold water piping in ceiling space above building insulation.

3.03 INTERIOR DUCTS

A. All concealed interior ductwork shall be insulated in accordance with "B" or "C".

B. Ducts shall be lined with 2-inch thick glass-fiber duct liner. Apply using a continuous coating of quick-tacking rubber based adhesive to hold the lining to the sheet metal and Stic-Clips or welded pins located not more than 18" on centers. All joints shall be pointed up to a smooth surface with asphalt emulsion reinforced with a glass fiber mesh.

C. Ductwork shall be insulated with 1-1/2" thick, 3/4 lb. density Fiberglas ED-75, Johns-Manville Microlite, or approved equal. The insulation shall be held in place with spot daubing of a quick tacking rubber base adhesive on approximately six inch centers. All end and longitudinal joints shall be butted firmly and sealed. Typical of all evaporative cooling ductwork.

D. All work shall be done in strict Accordance with the manufacturer's recommendations.

3.04 EXTERIOR DUCTS

A. Wrap all exterior ductwork with 2" thick, rigid fiberglas with FSK facing, Owens-Corning 703 or approved equal, 3 lb. density, secure with welded pins or clips and hold with washers not less than 1-1/4" diameter not more than twelve inches on center. Weatherproof complete with corrugated aluminum or mastic with fiberglas reinforcing mesh.

B. All work shall be done in strict accordance with the manufacturer's recommendations.

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## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. See Section 15010, General Mechanical Requirements

B. See Supplementary General Conditions and General Requirements, Division 1.

C. See Sections 15020 and 15100 for general requirements.

D. Domestic hot and cold water.

E. The General Conditions and other contract requirements in the Table of Contents apply to this section.

## PART 2 PRODUCTS

### 2.01 DOMESTIC WATER PIPING

A. Pipe Size 2" and smaller: Galvanized steel pipe.

1. Pipe Weight: Schedule 40

2. Fittings: Cast iron threaded, galvanized, class 125.

B. Tube size 2" and smaller: Copper Tube.

1. Wall Thickness: Type "L", hard drawn temper.

2. Fittings: Wrought copper, solder joint.

C. Tube size 2" and smaller: Crosslinked Polyethylene Tubing (PEX)

1. Compatible fitting

D. Pipe size 2-1/2" and larger: Galvanized steel pipe.

1. Pipe weight: Schedule 40.

2. Fittings: Mechanical grooved type.

E. Tube size 2-1/2" and larger: Copper tube.

1. Wall thickness: Type "L", hared drawn temper.

2. Fittings: Wrought copper, solder joint.

## 2.02 INSULATING COUPLING

Insulating couplings shall be furnished and installed at all connections between copper and steel pipe to prevent electrolysis.

## PART 3 EXECUTION

## 3.01 STERILIZATION

All domestic water piping shall be sterilized as follows: Chlorine shall be applied to provide a dosage of not less than 2500 part per million. The chlorinating material shall be introduced into the water line in a manner approved by the Architect. After a contact period of not less than eight hours, the system shall be flushed with clean water until the residual chlorine content is not greater than 0.2 parts per million. All valves in the line being sterilized shall be opened and closed several times during the contact period. Sterilize the complete domestic water system following the separation of the heating water system and the installation of the water heaters.

## 3.02 TESTS

A. General: All tests shall be conducted in the presence of the Architect or his representative and shall be corrected and retested until the test requirements are met.

B. Water Systems: The complete water system shall be hydrostatically tested at a pressure of 125 psi and shall show no loss of pressure for a period of one hour.

*******

PART 1

1.01 REQUIREMENTS

A. See Section 15010, General Mechanical Requirements

B. See Section 15020, Basic Materials and Methods.

C. Furnish and install all concrete, grout, and other required materials to fill all blockouts and/or sleeves left open for this Subcontractor's convenience or for the installation of this work.

D. All exposed piping and fixture tail pieces shall be chrome plated.

PART 2 PRODUCTS

2.01 PIPING

A. Above ground piping within buildings:

1. Pipe size 10" and smaller: Hubless cast iron soil pipe.

a. Pipe class: Service weight.

b. Fittings: Hubless cast iron soil pipe fittings, no-hub joints.

2. Pipe size 24" and smaller: Galvanized steel pipe.

a. Pipe weight: Schedule 40.

b. Fittings: Class 125, galvanized cast iron, drainage pattern, screwed joints.

3. Pipe size 6" and smaller: ABS plastic pipe where permitted by code.

a. Pipe weight: Type DWV

b. Fittings: ABS plastic, type DWV, socket-type, solvent cement joints.

4. Pipe size 8" and smaller: PVC plastic pipe where permitted by code.

a. Pipe weight: Type DWV.

b. Fittings: PVC plastic, type DWV, socket type, solvent cement joints.

B. Underground Building Drain Piping:

1. Pipe Size 10" and smaller: Hubless cast iron soil pipe.

a. Pipe class: Service weight.

b. Fittings: Hubless cast iron soil pipe fittings, no-hub joints.

2. Pipe size 6" or smaller: ABS plastic pipe where permitted by code.

a. Pipe weight: Type DWV.

b. Fittings: ABS plastic, type DWV, socket type, solvent cement joints.

3. Pipe size 6" or smaller: PVC plastic pipe where permitted by code.

a. Pipe weight: Standard.

b. Fittings: PVC sewer pipe fittings, solvent cement joints.

## 2.02 FLOOR DRAINS

Drains shall be Zurn, Wade, Smith, or approved equal, and shall be equal to those specified on the drawings. All floor drains shall be installed with grates squared with the building lines.

## 2.03 CLEANOUTS

Cleanouts shall be as manufactured by Zurn, Smith, Josam, Wade, or approved equal, and shall be of the same size as the pipe, except that cleanout plugs larger than 4 inches will not be required. Cleanouts installed in connection with cast iron soil pipe shall consist of a long sweep, quarter bend or one or two eighth bends extended to an easily accessible place, or as indicated on the drawings.

## PART 3 EXECUTION

### 3.01 INSTALLATION

Installation shall conform to Section 15010, general Mechanical Requirements and Section 15020, Basic Materials and Methods.

### 3.02 FLASHING

Vent pipes shall be flashed and made water tight at the roof in accordance with building suppliers recommendations. Vent pipes shall extend at least 12 inches above the roof.

### 3.03 TRAPS

Each fixture and piece of equipment connecting to the drainage system shall be equipped with a trap. Each trap shall be placed as near to the fixture as possible and no fixture shall be double trapped. All exposed traps and piping shall be chrome plated.

### 3.04 TESTS

The entire sanitary system and vent system shall be tested in accordance with the requirements of the Plumbing Code and the State of Colorado.

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3.04 ESCUTCHEONS

Where fixture supplies and drains penetrate walls in exposed locations, provide chrome plated sheet steel escutcheon with friction clips.

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## PART 1 GENERAL

### 1.01 SCOPE

A. See Section 15010, General Mechanical Requirements.

B. See Supplementary General Conditions and General Requirements.

C. The General Conditions and other contract requirements in the Table of Contents apply to this section.

## PART 2 PRODUCTS

### 2.01 FIXTURES AND EQUIPMENT

Fixtures by American Standard, Crane, Kohler, Eljer, or approved equal will be acceptable if, in the opinion of the Architect, they are equal to those specified on the drawings. All fixtures shall be white unless otherwise shown. The material used for plumbing fixtures shall be of non-absorptive acid-resistant material. Stop valves shall be provided at each fixture.

## PART 3 EXECUTION

### 3.01 FIXTURE AND EQUIPMENT SUPPORTS AND FASTENINGS.

Fixtures and equipment shall be supported and fastened in a satisfactory manner including suitable backing for all hanging fixtures and equipment. Bolts and nuts shall be expansion bolts. For wood use wood screws or through bolts. Where wood screws are used the screws shall go into solid wood, stubs, or solid pieces set between studs.

### 3.02 CLEANING

At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves, and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by operation of the system before and after testing. Any stoppage or discoloration or other damage to parts of the building, its finish or furnishings, due to the Contractor's failure to properly clean the system shall be repaired by the Contractor.

### 3.03 SHOCK ABSORBERS

Furnish and install where shown on plans, bellows type water hammer arresters, with stainless steel casing and bellow, rated for 250 psi, tested and certified in accordance with PDI Standard WH-201.

PART 1 GENERAL

1.01 SCOPE

See Sections 15010, 15020, and 15100 for general requirements.

PART 2 PRODUCTS

2.01 PIPING

Piping shall be Schedule 40 black steel pipe with forged steel welded fittings or screwed malleable iron fittings. Natural gas piping passing through return air spaces shall be installed in steel pipe sleeves and vented to the outside. Provide cathodic protection per state and local standards and requirements. Piping outside of buildings may the thermoplastic gas pressure pipe, tubing, and fittings complying with ASTM D 2517.

2.02 VALVES

A. Gas Cocks

1. Gas cocks 2" and smaller: 150 psi, non-shock, WOG, bronze straightway cock, flat or squared head, threaded ends.

2. Gas cocks 2-1/2" and larger: 125 psi, non-shock, WOG, iron body, bronze mounted, straightway cock, square head, flanged ends.

B. Control Valves.

1. Master Control Valve: Bronze body, packless, single seat, explosion proff, solenoid operated, normally closed, UL approved reset, 120 volt.

C. Pressure Regulating Valve.

1. Single stage, Steel jacketed, corrosion resistant, with atmospheric vent, elevation compensator; with threaded ends for 2" and smaller, flanged ends for 2-1/2" and larger.

## PART 3 EXECUTION

### 3.01 INSTALLATION

Furnish and install all piping as indicated on the drawings and all accessories in strict accordance with the applicable gas code. Install "Tee" fittings with bottom outlet plugged or capped at bottom of all pipe risers. Use dielectric unions where dissimilar metals are jointed together. Install piping with 1/64" per foot downward in the direction of flow.

### 3.02 TESTS

All low pressure gas piping shall be tested with air pressure of 10 psig and shall show no loss in pressure for a period of 24 hours on a recording pressure gauge, or per state inspector's requirements. All high pressure gas piping shall be tested with air pressure of 50 psig and shall show no loss in pressure for a period of 24 hours on a recording pressure gauge, or per state inspector's requirements.

*******

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. See Section 15010, General Mechanical Requirements.

B. See Supplementary General Conditions and General Requirements.

C. Furnish and install HVAC units, Exhaust Fans, Filters, Sheet Metal Work, Grilles, Diffusers and Registers, Accessories and Incidentals.

D. The General Conditions and other Contract requirements in the Table of Contents apply to this Section.

### 1.02 RELATED WORK IN OTHER SECTIONS.

A. Controls are specified under Section 15900.

B. Insulation and acoustical treatment are specified under Section 15180.

C. Electrical work as noted in Section 15010, General Mechanical Requirements.

## PART 2 PRODUCTS

### 2.01 GRILLES AND DIFFUSERS

Grilles, registers and diffusers shall be of size, finish, and type shown on the drawings and as listed in the schedule on the drawings. Grilles, registers, and diffusers as manufactured by Barber-Coleman, Carnes, Krueger, Titus, Tuttle & Bailey, or approved equal will be acceptable if, in the opinion of the Architect, they are equal to those specified.

### 2.02 EQUIPMENT SCHEDULES

All major items of equipment are specified in the equipment schedules and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory operating system.

2.03 FILTERS

Filters shall be furnished with the HVAC units. Provide one extra set for each piece of equipment, and turn over to the owner.

PART 3 EXECUTION

3.01 SHEET METAL WORK

A. Installation: All necessary allowances and provisions shall be made in the installation of sheet metal ducts for the structural conditions of the building, and ducts shall be transformed or divided as may be required. Whenever this is necessary, the required area shall be maintained. All of these changes, however, must be approved and installed as directed at the project site. During the installation, the open ends of all ducts shall be protected to prevent debris and dirt from entering.

B. Materials and Gauges: Construct all ducts, casings, plenums, etc., of galvanized steel sheets, of the gauges and joints specified in the latest SMACNA Manuals or current Uniform Mechanical Code. Sheets shall be free from blisters, slivers, pits, and imperfectly galvanized spots. Construct ducts using double Pittsburgh corner seams. All seams shall be hammered and made airtight.

C. Cross-Breaking: Rectangular sheet metal ducts shall be cross-broken on the four sides of each 4-foot panel. All vertical and horizontal sheet metal barriers, duct offsets, elbows, as well as 4-foot panels of straight sections of duct shall be cross-broken. Cross-breaking shall be applied to the sheet metal between the standing seams of reinforced angles. The center of cross-breaking shall be of the required height to assure surfaces being rigid.

D. Test Holes in Ductwork: Furnish test holes in ducts at locations for testing of air quantities in ducts. Ventlok or equal mechanical port vents shall be provided for closing test holes. Where these holes are installed in ductwork which is insulated there shall be provided a removable plug of approved insulation material.

E. All round ductwork and fittings used for duct mains and branches shall be spiral seam type as approved by the Engineer. All gauges, workmanship, and standards shall conform to the latest SMACNA Manuals for high velocity ductwork. All joints shall be screwed and caulked.

F. Hangers and Supports: Hangers for ducts up to 18 inches in width or diameter shall be placed on not more than 6 foot centers. Ducts 19 inches and over in width or diameter shall be supported on not more than 4 foot centers. Hangers shall be placed

plumb and present a neat appearance. Construct hangers from galvanized iron 1" x 16 GA. For ducts up to 60 inches in width or diameter, support ducts every 4'-0" with 2" X 2" X 1/4" angles. Hangers shall extend down the sides of the ducts using not less than three sheet metal screws of appropriate sizes with the end of each hanger bent under the duct, and attached at that point with another sheet metal screw. It is essential that all ducts be rigidly supported. Where vertical rectangular ducts pass through floors or roofs, supporting 12 GA. Angles shall be attached to ducts and to the structure. Angles shall be galvanized and of sufficient size to support the ductwork rigidly. Place supporting angles on at least two sides of the duct. All exposed hangers and supports shall be approved by the engineer prior to any work.

G. Flexible Connections: Provide flexible connections where shown on the drawings, not less than 4 inches wide, constructed of heavy waterproof woven glass fabric, at the inlet and outlet connection of each fan unit. Securely fasten to the unit and to the ductwork by a galvanized iron band, provided with tightening screws.

H. Turning Vanes: Turning vanes shall be installed in all square elbows where it is not possible to use low velocity radius elbows detailed on the drawings. Turning vanes shall be high efficiency type with double airfoil blades.

I. Flexible duct connections at diffusers or other low pressure applications shall be factory insulated, UP listed flexible conduit equal to Genflex, Wiremold, Thermaflex, Atko, Clevepak, or HK Porter. All flexible ducts shall not exceed a flame spread ratings of 25 or a smoke development rating of 50. Inside radius of bend shall not be less than the duct diameter. Connections to rectangular ducts shall be by spin-in type fittings, or equal. Maximum lengths for branch take-offs shall be 8'-0".

J. All diffuser locations shall be coordinated with the lighting and ceiling plans.

## 3.02 HAND DAMPERS

Install hand operated volume dampers at locations shown. Volume dampers shall be controlled by heavy duty locking quadrants mounted on the outside of the duct. Where ducts are insulated, the damper rod shall be extended and the operator shall be mounted on the outside of the insulation. Where volume dampers are installed on ducts over 12" deep, the dampers shall be made in two sections, each independently operated. No volume damper blades shall exceed 12" in width.

## 3.03 TESTS AND CLEANING

A. Cleaning of the Ducts: Before the ceiling is installed and final connections are made to the air diffusers or registers, it will be required that the fans be operated at full capacity to blow out dirt and debris from ducts. If it is not practical to use the main supply blower for this test, the ducts may be blown out in section by a portable fan.

B. Air Quantity Test: Testing and balancing shall be accomplished by an independent firm as described in Section 15010.

C. Operating Test Report: The Contractor shall have all of his equipment operating for a test period of not less than 24 hours, and check and adjust all of his equipment. During this operating period they shall instruct the Owner's operating personnel in the operation and maintenance of the system. The proposed operating test period shall be submitted to the Architect and Owner for approval. Submittal is required a minimum of two weeks prior to the operating test.

## 3.04 SEALING DUCTWORK

A. Low Pressure Ductwork: Joints shall be screwed, and taped or caulked.

B. Medium or High Pressure Ductwork: Joints shall be screwed, and taped with a minimum of two complete wraps.

C. Where joints are not accessible for proper sealing, hand holes shall be cut in the duct and the joints sealed from the inside.

*******

PART 1 GENERAL

1.01 REQUIREMENTS

Reference Section 15101, General Mechanical Requirements and Section 15910, electrical System Controls.

PART 2 PRODUCTS

2.01 CONTROL COMPONENTS

Components shall be electric or electronic equal to Barber-Coleman.

PART 3 EXECUTION

3.01 GENERAL

It is the intention of this specification that the Contractor furnish all of the associated temperature controls; and that the Contractor install the associated temperature controls, provide shop drawings, and perform tests and instructions.

3.02 WIRING

Control wiring shall be the responsibility of the Mechanical Contractor; and shall be wired under this section of the Specifications. The Contractor shall be responsible for coordinating all wiring, and shall submit wiring diagrams and requirements to the electrical contractor.

3.03 SHOP DRAWINGS

A complete shop drawing shall be provided showing the entire control system complete with wiring. This diagram shall be submitted for approval

3.04 TESTS AND INSTRUCTIONS

The integrity and accuracy of each function and control point shall be demonstrated to the satisfaction of the Architect. At the termination of the testing period, the Contractor shall spend one half working day instruction the Owner's operating personnel in the controls system operation. A complete operating booklet shall be approved by the Architect prior to training. The instruction period shall include review of the shop drawing control diagrams.

*******

PART 1 GENERAL

1.01 REQUIREMENTS

Reference Section 15010, General Mechanical Requirements.

1.02 SCOPE OF WORK

All disconnect means, motor controllers, and all electrical protective, and signal devices for equipment furnished under Division 15 of these specifications will be furnished, installed, and connected under Division 16 with the following exceptions:

A. Items scheduled, noted, or shown on the drawings or in the specifications to be furnished under Division 15.

B. Apparatus furnished with, mounted on, and connected integral with equipment furnished under Division 15.

C. If the substitution of equipment, devices, or systems furnished under this Division result in changes to the contract drawings, specifications and/or changes to the installation requirements not covered by the contract change orders, the complete responsibility and costs shall be assigned to the section of these specifications under which the equipment is furnished

D. Electrical items not shown on the electrical drawings but which are required for equipment furnished under Division 15 of this specification shall be furnished under the section of this specification which the equipment is furnished, and shall be installed and electrically connected under Division 16.

1.03 REQUIREMENTS

Provide connections to motors and controls for equipment furnished and/or installed under Division 15 according to the following schedule:

| ITEM | FURNISHED BY | SET BY | POWER WIRING | CONTROL WIRING |
|---|---|---|---|---|
| EQUIPMENT MOTORS | DIV. 15 | DIV. 15 | DIV. 16 | ---------- |
| MOTOR STARTERS AND OVERLOAD HEATERS | DIV. 16(A) | DIV. 16 | DIV 16 | DIV. 16 |

| | | | | |
|---|---|---|---|---|
| OUTSIDE MOTOR CONTROL CENTER | | | | |
| FUSED AND UNFUSED DISCONNECT SWITCHES, THERMAL OVERLOAD AND HEATERS | DIV. 16 | DIV. 16 | DIV. 16 ---------- | |
| MANUAL OPERATING AND MULTI-SPEED SWITCHES | DIV. 16(A) | DIV. 16 | DIV. 16 | DIV. 16 |
| CONTROL RELAYS | DIV. 16 | DIV. 16 | DIV. 16 | DIV. 16 |
| THERMOSTATS, TIME SWITCHES | DIV. 15 | DIV. 16 | DIV. 16 | DIV. 16 |
| MOTOR AND SOLENOID VALVES, DAMPER MOTORS | DIV. 15 | DIV. 15 | ---------- | DIV. 16 |
| TEMPORARY HEATING | DIV. 15 | DIV. 15 | DIV. 16 | DIV. 16 |
| FIRE ALARM PANEL AND INTERFACING WITH A/C SYSTEMS | DIV. 16 | DIV. 16 | DIV. 16 | DIV. 16 |
| CONTROL TRANSFORMERS | DIV. 16 | DIV. 16 | DIV. 16 | DIV. 15 |

(A) Unless specified as furnished under Division 15 by equipment schedule.

PART 2 PRODUCTS

2.01 SUBMITTALS

Submittal data for each individual electrically operated or electrically controlled or device furnished under this division of these specifications shall include complete electrical wiring diagrams and elementary control diagrams (ladder form) showing all internal and external wiring connections and services. **THE SUBMITTAL DATA SHALL ITEMIZE ALL ELECTRICAL CHARACTERISTICS THAT ARE OF A SPECIAL NATURE OR CRITICAL TO THE INSTALLATION OF THE CONTROL SYSTEM.** Such equipment and devices will not be considered for approval until these requirements are met.

2.02 PRODUCTS

The materials, equipment and devices related to the electrical system controls are specified under other sections of these specifications.

PART 3 EXECUTION

3.01 COORDINATION

The Contractor shall be responsible for reviewing and coordinating with all plans and specifications included in this project. This coordination will include but not be limited to the plumbing and electrical drawings. Any discrepancies will be brought to the attention of the Architect prior to bidding.

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**SECTION 26 05 00**
**COMMON WORK RESULTS FOR ELECTRICAL**

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Provide all supervision, labor, material, equipment, machinery, and other items necessary for a complete electrical system in accordance with these specifications and accompanying Drawings. Documents do not undertake to show or list every item to be provided. When items not shown are required for proper operation of the system or required by code, such items shall be provided at no increase in contract price.

### 1.2 STANDARDS, CODES AND REGULATIONS

A. Perform all work, furnish and install all material and equipment in full accordance with the latest applicable standards, rules, regulations, specifications and requirements in publications of the following organizations of the latest issues unless otherwise noted.
   a) ANSI - American National Standards Institute
   b) IEEE - Institute of Electrical and Electronic Engineers
   c) NFPA – National Fire Protection Association
   d) NEMA - National Electrical Manufactures' Association
   e) OSHA – Federal Occupational Safety and Health Administration
   f) Codes and regulations noted in other sections and as applicable

B. References to the above are minimum installation requirement standards.

C. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

D. Nothing in the Drawings or specifications shall be construed to permit work not conforming to applicable laws, ordinances, rules or regulations.

E. It is not the intent of the Drawings or specifications to repeat code requirements, except where necessary for completeness or clarity.

### 1.3 SUBMITTALS

A. Submit data for all materials for Division 26 to the Project Manager as specified below. Submission of individual items or partial and incomplete submittals will not be accepted without prior approval.

B. The Project Manager’s approval shall be obtained for all equipment and material in Divisions 26 before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval shall not be permitted at the job site.

C. All submittals shall include descriptive literature, catalog cut sheets, shop drawings and other data necessary for Project Manager to ascertain that the proposed equipment

and materials comply with specification requirements. Catalog cut sheets submitted for approval shall be legible and clearly identify equipment being submitted.

D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
   1. Submittals shall be marked to show specification reference including the section and paragraph numbers.
   2. Submit each section separately.

E. The submittals shall include the following:
   1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
   2. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion) associated with equipment or piping so that the proposed installation can be properly reviewed. Include sufficient fabrication information so that appropriate mounting and securing provisions may be designed and/or attached to the equipment.
   3. Parts list which shall include those replacement parts recommended by the equipment manufacturer.

## 1.4 OPERATIONS AND MAINTENANCE MANUALS

A. Provide operations and maintenance manuals as required for systems and equipment specified in the technical sections. Furnish two copies, bound in hardback binders, manufacturer's standard binders, or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.

B. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Lower-tier Subcontractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each Lower-tier Subcontractor installing the system or equipment and the local representatives for the system or equipment.

C. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.

D. The manuals shall include:
   1. Description of the function of each principal item of equipment.
   2. Installation instructions.
   3. Safety precautions for operation and maintenance.
   4. Diagrams and illustrations.
   5. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers and replacement frequencies.
   6. Performance data.

7. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
8. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.

E. Approvals will be based on complete submission of manuals together with shop drawings unless prior approval is obtained from the Project Manager.

## 1.5 INTENT OF DRAWINGS

A. Electrical plan drawings show only general locations of equipment, devices, and raceway, unless specifically dimensioned. Field conditions, non-interference with other trades, and architectural, structural and mechanical features shall determine the exact locations. In addition, the Project Manager reserves the right to make any reasonable change in the location of electrical items prior to “roughing-in”.

B. Electrical drawings are essentially diagrammatic to the extent that many offsets, kicks, bends, special fittings and exact locations of items are not indicated, unless specifically dimensioned. Exact routing of raceway shall be governed by structural conditions or obstructions.

C. Rough in locations shown on electrical drawings for equipment furnished by owner or by other divisions are approximate only.

## 1.6 RECORD DRAWINGS

A. As-built Contract Drawings shall be prepared by the Lower-tier Subcontractor marked with red indelible pencil to show all departures from original Drawings. Show concealed-in-concrete or underground cable, conduit, or duct runs dimensioned from established building lines, and all electrical work revisions. Field marked as-built Drawings shall be dated and signed by the Lower-tier Subcontractor.

# PART 2 - PRODUCTS

## 2.1 LISTING STANDARDS

A. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., standards where test standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI and is subject to Project Manager final approval. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:

1. Listed: Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed equipment or materials or periodic evaluation of services, and whose listing states that the equipment, material, or services either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled: Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified: equipment or product which:
    a) Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
    b) Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
    c) Bears a label, tag, or other record of certification.
4. Nationally recognized testing laboratory: laboratory which is approved, in accordance with OSHA regulations.

## 2.2 QUALIFICATIONS (PRODUCTS AND SERVICES)

A. Manufacturer’s Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.

B. Product Qualification:
1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
2. The Project Manager reserves the right to require the Lower-tier Subcontractor to submit a list of installations where the products have been in operation before approval.

C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation when service is needed. Submit name and address of service organizations.

## 2.3 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.

B. When more than one unit of the same class or type of equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:
1. Components of an assembled unit need not be products of the same manufacturer.

2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

E. Unless otherwise noted, provide materials, equipment and finish with manufacturers' standard finish system, except where specific color is indicated. If manufacturer has no standard color, finish equipment with ANSI No. 61, light gray color.

## 2.4 DEPARTURES FROM CONTRACT DOCUMENTS

A. Submit to Project Manager in writing details of any necessary or proposed departures from these Contract Documents and the reasons therefore. Submit such requests as soon as practical. Make no such departure without written approval of the Project Manager.

# PART 3 - EXECUTION

## 3.1 WORK PERFORMANCE

A. All work shall be installed in a neat, workmanlike manner in accordance with ANSI/NECA 1-2010 and utilizing craftsmen skilled in the particular trade.

B. All work performed under this division shall be coordinated with other trades prior to installation to prevent conflicts, errors, or delays.

C. Electrical work shall be accomplished with all affected circuits and/or equipment de-energized and all hazards identified/controlled. Written permission by the Project Manager is required prior to any energized work being performed, including commissioning.

D. Dimensions, locations of doors, partitions, and similar features shall be taken from the architectural drawings and verified at the site under this Division. Consult with the architect through the Project Manager for the exact location of all electrical devices to center with architectural features, panels, etc. at the approximate location shown on the electrical drawings.

E. Mounting height of brackets, outlets, switches etc. shall be as specified.

F. Check the approximate locations of light fixtures, electrical outlets, equipment, and other electrical system components shown on the Drawings for conflicts with openings, structural members, and components of other systems and equipment having fixed locations. In the event of conflicts, notify Project Manager in writing for modifications and changes required to correct conflicts.

## 3.2 GENERAL INSTALLATION REQUIREMENTS

A. Disturbed or damaged work shall be replaced or repaired to its prior condition.

B. Working spaces shall not be less than specified in the NEC for all voltages specified.

C. Inaccessible Equipment:
   1. Where the Project Manager determines that the Lower-tier Subcontractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Owner.
   2. "Conveniently accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

D. Follow manufacturer's directions when installing equipment.

E. Equipment shall be accurately set and level with supports neatly placed and properly fastened to prevent movement. No allowance of any kind will be made for negligence for bringing in, installing, or removing equipment inside buildings.

F. Provide direct raceway and conductor termination from building wiring system to equipment terminals for direct connected equipment which is Lower-tier Subcontractor-furnished and Lower-tier Subcontractor-installed, owner-furnished and Lower-tier Subcontractor-installed, and for all existing equipment that is relocated by the Lower-tier Subcontractor.

G. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounted items, unless indicated otherwise on drawings.

H. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

I. Verify electrical characteristics of equipment before starting rough-in. Where conflict exists between equipment and specified equipment obtain clarification from Project Manager and proceed as directed.

J. Seismic protection of electrical equipment shall be in accordance with the current version of the CBC.

K. Cleaning, Painting, and Tightening.
   1. Clean and tighten nuts, bolts, lugs, connections, etc. of all equipment and enclosures to manufacturer's published specifications. Where manufacturer's values are not furnished use those specified in UL 486A and UL 486B.
   2. Touch up scrapes, scratches, or chips in interior and exterior surfaces of devices and equipment with finished matching as nearly as possible the type, color, consistency, and type of surface of the original finish. If extensive damage is done to equipment paint surfaces, refinish the entire equipment in a manner that provides a finish equal to or better than the factory finish, that meets the requirements of the specifications, and that is acceptable to the Project Manager.
   3. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

4. Clean exposed conduit, panels (interior and exterior), fixtures, equipment and leave in satisfactory condition to Project Manager.

## 3.3 INTERRUPTION OF ELECTRICAL UTILITY

A. Maintain continuity of electrical service to all functioning portions of the facility or buildings at all times. Temporary outages will be permitted during cutover work at such times and places as approved in writing prior to work occurring.

B. Lower-tier Subcontractor shall not interrupt any main electrical utility or service (interior or exterior) without written permission by Project Manager for such interruption, or interrupt a single branch circuit to an outlet or piece of equipment without verbal approval from Project Manager.

## 3.4 EQUIPMENT PROTECTION

A. Equipment and materials shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
   1. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Equipment shall include but not be limited to, panel boards, circuit protective devices, cables, wire, light fixtures, electronic equipment, and accessories.
   2. During installation, equipment shall be protected against entry of foreign matter; and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
   3. Damaged equipment shall be, as determined by the Resident Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
   4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
   5. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas is not obvious.

## 3.5 INSPECTIONS AND TESTS

A. Electrical installations are subject to compliance inspections at any time. Lower-tier Subcontractor is to allow materials, equipment, and workmanship to be inspected at any time; at a minimum, electrical installations are to be inspected at the following points:
   1. Temporary construction power installations (prior to energizing)
   2. Rough-in (prior to covering installed systems)
   3. Trim-out (after wire installation and make-up)
   4. Service connection to building distribution (prior to energizing)
   5. Final electrical inspection

B. Correct work, materials, or equipment not in accordance with these contract documents or found to be deficient or defective in a manner satisfactory to the Project Manager.

C. The Lower-tier Subcontractor shall furnish the instruments, materials and labor to perform field testing of all systems and equipment installed under Division 26.
   1. Test panels for grounds, shorts, or opens with circuit breakers closed, fixtures in place, and all wall switches closed before energizing equipment.
      a) Test each individual circuit at panel with equipment connected for proper operation.
      b) Ground tests shall meet the requirements of the NEC.
      c) Upon completion of work, make final inspection and operate equipment to satisfaction of Project Manager.
      d) Upon completion of work, provide written certification that all electrical systems are functioning properly.

## 3.6 TRAINING

A. Training shall be provided for the particular equipment or system as required in each associated specification.

**END OF SECTION**

**SECTION 26 05 19**
**LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This section specifies the furnishing, installation and connection of low voltage (600V and less) power, lighting, control and signal wiring.

B. Related work:
   1. Section 26 05 00 “Common Work Results for Electrical”: General electrical requirements and items that are common to more than one section of Division 26.
   2. Section 26 05 26 “Grounding and Bonding for Electrical Systems”: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents
   3. Section 26 05 33 “Raceway and Boxes for Electrical Systems”: Conduits for cables and wires.
   4. Section 26 05 53 “Identification for Electrical Systems”: Requirements for identification of electrical materials, equipment and installations.

### 1.2 REFERENCES

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the designation only:
   1. ASTM International:
      a. B3-2012 “Standard Specification for Soft or Annealed Copper Wire”
   2. National Electrical Manufacturers Association (NEMA):
      a. WC 70-2009 “Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy” (ICEA S-95-658-2009)
   3. National Fire Protection Association (NFPA):
      a. 70-2011 “National Electrical Code (NEC)”
   4. Underwriters Laboratories, Inc. (UL):
      a. 44-2010 “Thermoset-Insulated Wires and Cables”
      b. 83-2008 “Thermoplastic-Insulated Wires and Cables”
      c. 467-2007 “Grounding and Bonding Equipment”
      d. 486A-486B-2003 “Wire Connectors”
      e. 486C-2004 “Splicing Wire Connectors”

### 1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00 “Common Work Results for Electrical” for each type of product indicated. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

B. Include data sheets for the following additional items:
   1. Splice and termination kit information prior to purchase and installation.

2. Cable minimum bend radius and flammability data.
3. Cable accessories
4. Pulling compounds

## PART 2 - PRODUCTS

### 2.1 CONDUCTORS AND CABLE

A. Conductors and cables shall be in accordance with NEMA WC-70 and as specified herein.

B. Conductors shall be copper conforming to ASTM B3. No aluminum conductors shall be used under any circumstances. Do not provide conductors smaller than those indicated.

C. Low voltage power cables shall include multiple and single-conductor cable rated 600 Volts:
   1. Insulation types THHN/THWN or XHHW-2.
   2. Color coding:
      a. All single conductors and individual conductors of multi-conductor power cables shall be provided with continuously colored wire insulation of the designated colors.
      b. Conductors larger than No. 6 AWG may be color coded by wrapping the conductor at each end and at all accessible locations such as junction boxes, conduit fittings, other electrical enclosures, with vinyl tape. Where this method of color coding is used, apply half lapped layer of Scotch #35 colored vinyl adhesive tape matching color coding below and covering an area of 2-1/2 inches minimum. Conductor insulation itself shall be black.

      c. Power and lighting circuit conductors shall be color-coded as follows.

| Voltage | Phase A | Phase B | Phase C | Neutral | Ground |
|---|---|---|---|---|---|
| 208/120 | Black | Red | Blue | White | Green |
| 480/277 | Brown | Yellow | Purple | White | Green |

D. Manufacturers: General Cable, Anaconda, Southwire, or equal.

E. Control and instrumentation cable:
   1. Shall be Belden 8760 #18 AWG copper shielded twisted pair with #20 AWG copper drain wire, unless otherwise noted in the Contract Documents.
   2. Control and Instrumentation wiring 120V and below shall be color-coded as follows, unless otherwise noted in the Contract Documents.
      Ground wire: White
      Ungrounded wire: Black

F. Class 2 plenum rated cable, multi-conductor, NEC type CL2P, CMP and MPP required for all open wiring installations.

## 2.2 ACESSORIES, SPLICES AND TERMINATIONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Burndy, Thomas & Betts
   2. O-Z/Gedney; EGS Electrical Group LLC
   3. 3M; Electrical Products Division
   4. Ilsco Products

B. Terminations, Splices, and Taps:
   1. Copper conductors No. 10 AWG and smaller: Compression type or twist-on spring loaded connectors and nylon insulated covering.
   2. Copper conductors No. 8 AWG and larger: Mechanical bolted pressure or hydraulic compression type:
   3. For copper Lugs and connectors: Compression type of same material as conductor with marking indication size and type.
   4. For copper lug connections to bus bars, provide anti-seize compound.

## PART 3 - EXECUTION

## 3.1 GENERAL

A. Installation shall be in accordance with the NEC, manufacturer's instructions and as specified.

B. An equipment grounding conductor shall be required for all circuits.

C. Separate neutral conductors shall be required for all circuits.

D. All 600V conductors and cables shall be installed in conduit or approved raceway, unless otherwise noted in the Contract Documents or by prior written approval of the Project Manager. No more than three circuits shall be installed in one conduit

E. Prior to installation of cables, thoroughly clean and wipe dry all conduit and wire ways before pulling any wire. Use “Ideal 77” Yellow, or Minerallac #100” pulling compound.

F. Minimum conductor sizes:
   a. Power and lighting wiring shall be No. 12 AWG minimum. For 120V circuit lengths over 70 feet, minimum conductor size shall be No. 10 AWG.
   b. Control and signal wiring shall be No. 14 AWG minimum. For 120V circuits over 60 feet in length, minimum size shall be No. 12 AWG.
   c. Low voltage sensor wiring shall be No. 22 AWG.

G. Wire Pulling:
   1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables. Use lubricants approved for the cable.
   2. Use nonmetallic ropes for pulling feeders.

3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Project Manager.
4. All cables in a single conduit shall be pulled simultaneously.
5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
6. Pull no thermoplastic wires at temperatures lower than 0°C (32°F).

H. Splices and Terminations:
1. Splice cables and wires only in outlet boxes, junction boxes, pull-boxes, manholes, and handholes.
2. Splices and terminations shall be mechanically and electrically secure.
3. Tighten electrical connectors and terminals according to manufacturer's published torque value.

I. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.

J. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form, train, and tie the cables in individual circuits.

K. Open Wiring Installations:
1. Run cables in concealed plenum spaces above suspended ceiling without raceway. Neatly bundle and run cables together wherever possible.
2. Attach cables to existing raceway supports and / or ceiling grid wires at intervals not to exceed five feet.
3. Keep cables a minimum of 24 inches above suspended ceilings.

## 3.2 ACCEPTANCE CHECKS AND TESTS

A. Testing shall be in accordance with Section 26 05 00 "Common Work Results for Electrical".

B. Tests and Inspections:
1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written test report to record the following:
1. Test procedure used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

**SECTION 26 05 26**
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This section specifies general grounding and bonding requirements of electrical equipment operations in order to provide a low impedance path for possible ground fault currents.

B. “Grounding electrode system” refers to all electrodes required by NEC, as well as supplementary and lightning protection system grounding electrodes.

C. The terms “connect” and “bond” are used interchangeably in this specification and have the same meaning.

D. Related Work:
   1. Section 26 05 00 “Common Work Results”: General electrical requirements and items that are common to more than one section of Division 26.
   2. Section 26 05 19 “Low-Voltage Electrical Power Conductors and Cables”: Conductors and cables 600 volts and below.

### 1.2 REFERENCES

A. Publications listed below, including amendments, addenda, revisions, supplements, and errata, form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. ASTM International:
   1. B1-12 “Standard Specification for Hard-Drawn Copper Wire”
   2. B8-11 “Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft”

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   1. 81-1983 “IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System”

D. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   1. 142-2007 “IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems” (Green Book)

E. National Electrical Manufacturers Association (NEMA):
   1. GR-1-2007 “Grounding Rod Electrodes and Grounding Rod Electrode Couplings”

F. National Fire Protection Association (NFPA):
   1. 70-2011 “National Electrical Code (NEC)”

G. Underwriters Laboratories, Inc. (UL):
   1. 44-2010 “Thermoset-Insulated Wires and Cables”
   2. 83-2008 “Thermoplastic-Insulated Wires and Cables”
   3. 467-2007 “Grounding and Bonding Equipment”
   4. 486A-486B-2003 “Wire Connectors”

## 1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00 “Common Work Results” for each type of product indicated.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.

C. Other informational submittals: Plans showing dimensioned as-built locations of grounding features, including the following:
   1. Ground rods
   2. Grounding arrangements and connections for separately derived systems.
   3. Grounding for sensitive electronic equipment.

D. Test Reports: Provide certified test reports of overall resistance to ground.

E. Certifications: Two weeks prior to final inspection, submit two copies of the following to the Project Manager:
   1. Certification that the materials and installation is in accordance with the drawings and specifications.

# PART 2 - PRODUCTS

## 2.1 GENERAL

A. Electrical components, devices, and accessories: Listed and labeled by a NRTL and marked for intended use.

B. Manufacturer’s qualifications: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.

C. Comply with UL 467 for grounding and bonding materials and equipment.

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
   1. Electrodes:
      a. Burndy
      b. Thomas and Betts
   2. Mechanical connectors:
      a. Burndy
      b. Thomas and Betts

3. Exothermic connections:
    a. Burndy
    b. Cadweld
    c. Ultraweld (Harger)

## 2.2 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be UL 83 insulated (stranded copper.) Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes #4 AWG and larger shall be permitted to be identified per NEC.

B. Bonding conductors shall be ASTM B8 insulated stranded copper.

C. Electrical System Grounding: Conductor sizes shall not be less than what is shown on the drawings and not less than required by the NEC, whichever is greater.

## 2.3 SPLICES AND TERMINATIONS

A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

## 2.4 GROUND CONNECTIONS

A. Above Grade:
    1. Bonding Jumpers: UL listed, compression type connectors, using zinc-plated fasteners and external tooth lock washers.
    2. Connection to Building Steel: Irreversible compression-type connectors listed for grounding or exothermic welding.
    3. Ground Bus bars: Two-hole compression type lugs, using tin-plated copper or copper alloy bolts and nuts.
    4. Rack and Cabinet Ground Bars: One-hole compression-type lugs, using zinc-plated or copper alloy fasteners.

## 2.5 EQUIPMENT RACK AND CABINET GROUND BARS

A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 0.375 in. thick x 0.75 in. wide.

## 2.6 GROUND TERMINAL BLOCKS

A. At any equipment mounting location (e.g. backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

## 2.7 GROUND RODS

A. Steel or copper clad steel, 3/4in. diameter by 10ft. long, conforming to UL 467.

B. Quantity of rods shall be as required to obtain the specified ground resistance, as shown on the drawings.

## 2.8 CONCRETE ENCASED ELECTRODE

A. Concrete encased electrode shall be No. 4 AWG bare copper wire, installed per NEC.

## 2.9 SPLICE CASE GROUND ACCESSORIES

A. Splice case grounding and bonding accessories shall be supplied by the splice case manufacturer when available. Otherwise, use #6 AWG insulated ground wire with shield bonding connectors.

# PART 3 - EXECUTION

## 3.1 GENERAL

A. Ground in accordance with the NEC, as shown on drawings, and as specified herein.

B. Equipment Grounding: Metallic structures including ductwork and building steel, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

C. Underground Grounding Conductors: Install bare tinned-copper conductor.
   1. Bury at least 24 inches below grade.

## 3.2 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections, which are normally buried or otherwise inaccessible (except connections for which periodic testing access is required) by the exothermic process, to form solid metal joints.

B. Below-grade connections shall be visually inspected by Project Manager prior to backfilling. The Lower-tier Subcontractor shall notify Project Manager no less than 24 hours before the connections are ready for inspection.

## 3.3 SECONDARY EQUIPMENT AND CIRCUITS

A. Service Disconnect (Separate Individual Enclosure): Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.

B. Panelboards:
   1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
   2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
   3. Provide ground bars, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.

4. Connect metallic conduits which terminate without mechanical connection to the housing by grounding bushings and grounding conductor to the equipment ground bus.

C. Metallic Piping, Building Steel, and Supplemental Electrode(s):
   1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building steel, and supplemental or made electrodes. Provide jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
   2. Provide a supplemental ground electrode and bond to the grounding electrode system.

D. Conduit Systems:
   1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
   2. Non-metallic conduit systems, except non-metallic feeder conduits which carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
   3. Metallic conduit containing only a grounding conductor, and which is provided for mechanical protection of the conductor, shall be bonded to that conductor at the entrance and exit from the conduit.

E. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders and power branch circuits.

F. Boxes, Cabinets, Enclosures, and Panelboards:
   1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes.
   2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
   3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.

G. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.

H. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

I. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

## 3.4 CORROSION INHIBITORS

A. When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

B. Use UL listed Al/Cu connectors.

## 3.5 WIREWAY SYSTEMS

A. Bond the metallic structures of wireway to provide 100 percent electrical continuity throughout the wireway system by connecting a #6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.

B. Install insulated #6 AWG bonding jumpers between the wireway system bonded as specified above, and the closest building ground at each end and approximately every 50 feet.

## 3.6 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 25 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost to the Owner. Final tests shall assure that this requirement is met.

B. Resistance of the grounding electrode system shall be measured using a three-point or fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

## 3.7 GROUND ROD INSTALLATION

A. For outdoor installations, drive each rod vertically in the earth until the top of the rod is 24 in. below final grade.

B. For indoor installations, leave 4 in. of rod exposed.

C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

**END OF SECTION**

**SECTION 26 05 33**
**RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.

B. Related Work:
   1. Section 26 05 00 “Common Work Results for Electrical”, general electrical requirements and items that is common to more than one section of Division 26.
   2. Section 26 05 26 “Grounding and Bonding for Electrical Systems”, requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
   3. Section 26 05 53 “Identification for Electrical Systems”: Requirements for identification of electrical materials, equipment and installations.

### 1.2 REFERENCES

A. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

B. Reference Standards: Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
   1. National Fire Protection Association (NFPA):
      a. 70-05 “National Electrical Code (NEC)”
   2. Underwriters Laboratories, Inc. (UL):
      a. 1-03 “Flexible Metal Conduit”
      b. 5-01 “Surface Metal Raceway and Fittings”
      c. 6-03 “Rigid Metal Conduit”
      d. 50-03 “Enclosures for Electrical Equipment”
      e. 360-03 “Liquid-Tight Flexible Steel Conduit”
      f. 467-01 “Grounding and Bonding Equipment”
      g. 514A-01 “Metallic Outlet Boxes”
      h. 514B-02 “Fittings for Cable and Conduit”
      i. 514C-05 “Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers“
      j. 651-02 “Schedule 40 and 80 Rigid PVC Conduit”
      k. 651A-03 “Type EB and A Rigid PVC Conduit and HDPE Conduit”
      l. 797-03 “Electrical Metallic Tubing”
   3. National Electrical Manufacturers Association (NEMA):
      a. TC-2 “Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
      b. TC-3 “PVC Fittings for Use with Rigid PVC Conduit and Tubing”
      c. FB1 “Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable”
      d. C80.1 “Specification for Rigid Steel Conduit, Zinc Coated”

e. RN 1 “Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit”

## 1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00 “Common Work Results for Electrical” for each type of product indicated. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

B. Shop Drawings:
1. Size and location of main feeders
2. Size and location of panels and pull boxes
3. Layout of required conduit penetrations through structural elements.
4. The specific item proposed and its area of application shall be identified on the catalog cuts.

# PART 2 - PRODUCTS

## 2.1 MATERIAL

A. Conduit Size: In accordance with the NEC, but not less than 3/4 inch unless otherwise shown. Where permitted by the NEC, 1/2 inch flexible conduit may be used for tap connections to recessed lighting fixtures.

B. Raceways:
1. Rigid galvanized steel: Shall Conform to UL 6, ANSI C80.1.
2. RGS PVC externally coated conduit: NEMA RN 1; rigid steel conduit with external 20-mil PVC coating and internal galvanized surface.
3. Electrical metallic tubing (EMT): Shall Conform to UL 797, ANSI C80.3. Maximum size not to exceed 4 inches and shall be permitted only with cable rated 600 volts or less.
4. Flexible galvanized steel conduit: Shall Conform to UL 1.
5. Liquid-tight flexible metal conduit: Shall Conform to UL 360.
6. Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).
7. Surface metal raceway: Shall Conform to UL 5.
8. Aluminum conduit: Not allowed.

C. Conduit Fittings:
1. Rigid galvanized steel conduit fittings:
a. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
b. Standard threaded couplings, locknuts, bushings, and elbows: Only steel or malleable iron materials are acceptable.
c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
d. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
e. Erickson union-type: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete.

f. Set screw couplings are not permitted.
g. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.

2. Electrical metallic tubing fittings:
   a. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
   b. Only steel or malleable iron materials are acceptable.
   c. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors. Set screw fittings not permitted.
   d. Indent type connectors or couplings are prohibited.
   e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
3. Flexible steel conduit fittings:
   a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
   b. Clamp type, with insulated throat.
4. Liquid-tight flexible metal conduit fittings:
   a. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
   b. Only steel or malleable iron materials are acceptable.
   c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
5. Direct burial plastic conduit fittings:
   a. Fittings shall meet the requirements of UL 514C and NEMA TC3.
   b. As recommended by the conduit manufacturer.
6. Surface metal raceway fittings: As recommended by the raceway manufacturer.
7. Expansion and deflection couplings:
   a. Conform to UL 467 and UL 514B.
   b. Accommodate 0.75 inch deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
   c. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
   d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.

D. Conduit Supports:
1. Parts and hardware: Zinc-coated or provide equivalent corrosion protection.
2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
3. Multiple conduit (trapeze) hangers: Not less than 1-1/2 by 1-1/2 inch, 12 gauge steel, cold formed, lipped channels; with not less than 3/8 inch diameter steel hanger rods.
4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

E. Outlet, Junction, and Pull Boxes:
1. UL-50 and UL-514A.
2. Cast metal where required by the NEC or shown, and equipped with rustproof boxes.

3. Sheet metal boxes: Galvanized steel, except where otherwise shown.
4. Flush mounted wall or ceiling boxes shall be installed with raised covers so that front face of raised cover is flush with the wall. Surface mounted wall or ceiling boxes shall be installed with surface style flat or raised covers.
5. Pull boxes for underground installation:
    a. Shall be “FL” style box assemblies of Fibrelyte composite materials as manufactured by Christy Concrete products or approved equal, unless otherwise noted on drawings. Material compressive strength shall not be less than 11,000 psi.
    b. Covers shall be bolted-down using penta-head bolts, heavy duty to meet AASHTO H20 traffic load and logo as indicated. Boxes shall be stackable for extra depth. Dimension of pull boxes shall be as specified on drawings.

F. Wireways: Equip with hinged covers, except where removable covers are shown. Minimum thickness of 16 gage galvanized steel for interior use. Minimum thickness of 14 gage galvanized steel, weatherproof and gasketed for exterior use. Acceptable manufacturer: Hoffman Engineering Co., Square D Co., or equivalent.

G. Surface duct: Complete with all fittings and accessories. Single duct configuration with devices as shown on Contract Drawings. Acceptable manufacturer: Walkermold Series 1700 Surface duct or equivalent.

H. Warning Tape: Standard, 4-Mil polyethylene 3 inch wide tape detectable type, red with black letters, and imprinted with “CAUTION -- BURIED ELECTRIC LINE BELOW”.

I. Tracer Wire: 12 gauge tracer wire manufactured by Copperhead Industries.

## PART 3 - EXECUTION

### 3.1 GENERAL

A. In accordance with UL, NEC, as shown, and as hereinafter specified.

B. Essential (Emergency) raceway systems shall be entirely independent of other raceway systems, except where specifically "accepted" by NEC Article 517.

C. Install conduit as follows:
1. Complete raceway installation before starting conductor installation.
2. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.
3. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
4. Cut square with a hacksaw, ream, remove burrs, and draw up tight.
5. Mechanically and electrically continuous.
6. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
7. Support within 12 inches of changes of direction, and within 12 inches of each enclosure to which connected.
8. Close ends of empty conduit with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.

9. Limit flexible conduit (all types) to a maximum length of six feet.
10. Secure conduits to cabinets, junction boxes, pull boxes and outlet boxes with bonding type locknuts. For rigid conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
11. Provide pullboxes where required by code and where necessary in the raceway system to facilitate conductor installation. In general, conduit runs of more than 100 feet, or with more than three right-angle bends, shall have a pullbox installed at a convenient intermediate location. Support boxes independently of raceways, walls, and partitions.
12. Flashing of penetrations of the roof membrane is specified in Section 07 60 00 "Flashing and Sheet Metal".
13. Clearance from Water, Steam, or Other Piping: Minimum 3 inch separation from pipes, except 4 inches from pipe cover at crossings.

D. Conduit Bends:
   1. Make bends with standard conduit bending machines.
   2. Conduit hickey may be used for slight offsets, and for straightening stubbed out conduits.
   3. Bending of conduits with a pipe tee or vise is prohibited.
   4. Number of bends shall conform to code requirements.

E. Layout and Homeruns:
   1. Install conduit with wiring, including homeruns, as shown.
   2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted approved by the SDR.

F. Supports shall be mounted to structure with:
   a. Toggle bolts on hollow masonry.
   b. Expansion shields or inserts on concrete.
   c. Machine screws on metal.

G. All spare or empty conduits over 10 feet in length shall be capped or sealed to prevent debris from entering the conduit, except for stub-outs inside panels. A 1/4 in. polypropylene pull rope shall be provided in each conduit, with at least 2 feet of slack at each end. The ends of the rope shall be securely attached.

## 3.2 CONCEALED WORK INSTALLATION

A. Furred or Suspended Ceilings and in Walls:
   1. Conduit for conductors above 600 volts:
      a. Rigid galvanized steel.
   2. Conduit for conductors 600 volts and below:
      a. Rigid galvanized steel or EMT. Different type conduits mixed indiscriminately in the same system is prohibited.
   3. Align and run conduit parallel or perpendicular to the building lines.
   4. Connect recessed lighting fixtures to conduit runs with maximum six feet of flexible metal conduit extending from a junction box to the fixture.
   5. Do not attach any component to ceiling wire or install conduit less than 12 inches from the ceiling.

## 3.3 EXPOSED WORK

A. Unless otherwise indicated on the drawings, exposed conduit is only permitted in mechanical and electrical rooms.

B. Conduit for conductors above 600 volts:
   1. Rigid galvanized steel.

C. Conduit for Conductors 600 volts and below:
   1. Rigid galvanized steel.
   2. EMT may be used indoors above panelboards, or above heights of eight feet where protected from damage.
   3. Different type of conduits mixed indiscriminately in the system is prohibited.

D. Align and run conduit parallel or perpendicular to the building lines.

E. Install horizontal runs close to the ceiling or beams and secure with conduit straps.

F. Support horizontal or vertical runs at not over eight foot intervals.

G. Surface metal raceways: Use only where shown.

## 3.4 WET OR DAMP LOCATIONS

A. Unless otherwise shown, use conduits of Rigid galvanized steel only.

B. Provide sealing fittings, to prevent passage of water vapor, where conduits pass from warm to cold locations, such as refrigerated spaces, constant temperature rooms, air - conditioned spaces building exterior walls, roofs or similar spaces.

C. Unless otherwise shown, use Rigid galvanized steel conduit within five feet of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers. Conduit shall include an outer factory coating of 20 mil bonded PVC or field coat with asphalt tum before installation. After installation, completely coat damaged areas of coating.

## 3.5 PENETRATIONS

A. Cutting or Holes:
   1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Project Manager prior to drilling through structural sections.
   2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Project Manager as required by limited working space.

B. Fire Stop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an

effective barrier against the spread of fire, smoke and gases with rock wool fiber or silicone foam sealant only. Completely fill and seal clearances between raceways and openings with the fire stop material.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight.

## 3.6 MOTORS AND VIBRATING EQUIPMENT

A. Use flexible metal conduit for final connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.

B. Provide liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside air stream of HVAC units, and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with flexible metal conduit.

C. Maximum permitted length is 18 inches with minimum of 20% slack.

## 3.7 CONDUIT SUPPORTS

A. Safe working load shall not exceed 1/4 of proof test load of fastening devices.

B. Independently support conduit at 8 feet on center. Do not use other supports such as suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping, or mechanical ducts. Use pipe straps or individual conduit hangers for supporting individual conduits.

C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 200 pounds. Attach each conduit with U-bolts or other approved fasteners.

D. Support conduit independently of junction boxes, pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.

E. Fasteners and Supports in Solid Masonry and Concrete:
   1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
   2. Existing Construction:
      a. Steel expansion anchors not less than 1/4 inch bolt size and not less than 1-1/8 inch embedment.
      b. Power set fasteners not less than 1/4 inch diameter with depth of penetration not less than three inches.
      c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.

F. Hollow Masonry: Toggle bolts are permitted.

G. Bolts supported only by plaster or gypsum wallboard are not acceptable.

H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.

J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.

K. Spring steel type supports or fasteners are prohibited for all uses except: Horizontal and vertical supports/fasteners within walls.

L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

## 3.8 BOX INSTALLATION

A. Boxes for Concealed Conduits:
   1. Flush mounted.
   2. Provide raised covers for boxes to suit the wall or ceiling, construction and finish.

B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling in operations.

C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

D. Outlet boxes in the same wall mounted back-to-back are prohibited. A minimum 24 inch, center-to-center lateral spacing shall be maintained between boxes.

E. Minimum size of outlet boxes for ground fault interrupter GFI receptacles is 4 inches square by 2-1/8 inches deep, with device covers for the wall material and thickness involved.

**END OF SECTION**

**SECTION 26 05 53**
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes:
1. Identification for raceways, cables, and conductors.
2. **[Buried electrical line warnings]**
3. **[Warning and caution labels and signs]**
4. **[Instruction signs]**
5. Equipment identification labels and signs
6. Miscellaneous identification products

### 1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.***//***

C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.***//***

### 1.3 QUALITY ASSURANCE

A. Comply with the following:
1. ANSI A13.1 and ANSI C2.
2. NFPA 70
3. NFPA 99
4. 29 CFR 1910.144 and 29 CFR 1910.145
5. ANSI Z535.4 and ANSI ZG3.22 for safety signs and labels
6. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers shall comply with UL 969.

## PART 2 - PRODUCTS

### 2.1 RACEWAY LABELS

A. Self-adhesive Labels: Repositionable vinyl cloth conduit marker. Manufacturers: Brady conduit and voltage markers, or approved equal.
1. 120/240 Volts: Orange background with black numbers “120/240 VOLTS”

### 2.2 EQUIPMENT LABELS

A. Nameplates for normal power system equipment shall be laminated black phenolic resin with a white core with engraved lettering. Nameplates for critical or emergency

electrical system equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering.

1. Lettering shall be a minimum of 1/2 inch high.
2. Indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of power branch as applicable, power source (panel & circuit).

## 2.3 UNDERGROUND LINE WARNING TAPE

A. Permanent, bright-colored, continuous-printed, polyethylene tape.
   1. Not less than 6 inches wide by 4 mils thick.
   2. Compounded for permanent direct-burial service.
   3. Embedded continuous metallic strip or core.
   4. Printed legend shall indicate type of underground line.

## 2.4 WARNING LABELS AND SIGNS

A. Self-adhesive Warning Labels: Factory printed, multi-color, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

B. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. Grommets (1/4inch) in corners for mounting. Nominal size: 7 in. x 10 in.

## 2.5 DEVICE LABELS

A. Self-adhesive Device Labels: P-touch or similar label maker with minimum ½" tape.

# PART 3 - EXECUTION

## 3.1 GENERAL

A. Identify nameplate, label and sign locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Clean surfaces for self-adhesive products before application, using materials and methods recommended by manufacturer of identification device.

## 3.2 EQUIPMENT/DEVICE IDENTIFICATON

A. Provide nameplates for panel boards, self-enclosed circuit breakers, disconnect switches, and similar equipment.

B. Secure nameplates with 30 year silicone caulk.

C. Identify all visible receptacles, switches, outlets, and other devices by means of ½" clear embossing label with black letters.

## 3.3 RACEWAY AND BOX IDENTIFICATION

A. Provide identification on all conduits, at 20 ft. on centers in all exposed areas and upon entering or leaving an area, legible from the floor but no smaller than 3/4 inch high, for power conduits, fire alarm conduits, and controls conduits.

B. For exposed conduits in offices or similar commercial areas, provide identification labels only at entrance to such areas with 1/2 inch high lettering.

C. All conduits stubs to be labeled with name of panel, switchboard, etc. of origin and conduit size.

D. Junction and Pull Boxes:
   1. Mark panel and circuit numbers with voltage on the cover of all junction and pull boxes. For normal power, label shall be black letters on white tape. For emergency power, label shall be white letters on red tape.

E. Tags:
   1. Flameproof linen or fiber in accessible locations, attached with plastic ties.
   2. Feeders: indicate number size, phase, point of origin and terminations
   3. Control or Alarm: Indicate type of controls or alarm point of origin and terminations.

F. Direct-buried Conduits:
   1. Identify with underground-line warning tape for power.
   2. During backfilling of trenches, install continuous underground-line warning tape directly above at 12 inches below finished grade.

## 3.4 CONDUCTOR IDENTIFICATION

A. In each pull-box, junction box or enclosure, provide pre-numbered self-adhesive band on each wire indicating panel and circuit, or wire number, corresponding to those on the contract drawings. In addition, mark all branch circuit numbers on the cover of all junction boxes.

B. For control and signal wiring: Install a permanent wire marker on each wire at each termination. Identifying numbers and letters on the wires markers shall correspond to those on the wiring diagrams used for installation.

C. Wire markers and tags shall retain their markings after cleaning.

D. Color coding shall comply with Section 26 05 19 “Low Voltage Electrical Power Conductors and Cables”.

E. Direct-buried cables:
   1. Identify with underground-line warning tape for power.
   2. During backfilling of trenches, install continuous underground-line warning tape directly above at 12 inches below finished grade.

## 3.5 WARNING SIGNS

A. Provide on all equipment with multiple power sources a warning sign that reads “DANGER – EQUIPMENT HAS MULTIPLE POWER SOURCES”.

**END OF SECTION**

**SECTION 26 27 26**
**WIRING DEVICES**

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This section specifies the furnishing, installation and connection of wiring devices.

B. Related Work
   1. Section 26 05 00 "Common Work Results for Electrical": General electrical requirements that are common to more than one section of Division 26.
   2. Section 26 05 21 "Low-Voltage Electrical Power Conductors and Cables": Conductors and cables 600V and below.
   3. Section 26 05 26 "Grounding and Bonding for Electrical Systems": Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.
   4. Section 26 05 33 "Raceway and Boxes for Electrical Systems": Conduits and outlets boxes.
   5. Section 26 05 53 “Identification for Electrical Systems”: Requirements for identification of electrical materials, equipment and installations.

### 1.2 REFERENCES

A. Publications listed below, including amendments, addenda, revisions, supplements and errata, form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

B. National Fire Protection Association (NFPA):
   1. 70 "National Electrical Code" (NEC)

C. National Electrical Manufacturers Association (NEMA):
   1. WD 1 "General Color Requirements for Wiring Devices"
   2. WD 6 "Wiring Devices – Dimensional Requirements"

D. Underwriters Laboratories, Inc. (UL):
   1. 5 "Surface Metal Raceways and Fittings"
   2. 20 "General-Use Snap Switches"
   3. 231 "Power Outlets"
   4. 467 "Grounding and Bonding Equipment"
   5. 498 "Attachment Plugs and Receptacles"
   6. 943 "Ground-Fault Circuit-Interrupters"

### 1.3 SUBMITTALS

A. In accordance with Section 26 05 00 "Common Work Results for Electrical", submit the following:

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include electrical ratings, dimensions, mounting details, construction materials, grade and termination information.

C. Manuals: Two weeks prior to final inspection, deliver two copies of the following to the Engineer: Technical data sheets and information for ordering replacement units, all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

## PART 2 - PRODUCTS

### 2.1 GENERAL WIRING DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: NRTL listed and labeled as defined in NFPA 70 and marked for intended location and application.

B. Each type of wiring device and associated wall plate shall be obtained from single source and from single manufacturer.

### 2.2 RECEPTACLES

A. General: All receptacles shall be NRTL listed and conform to NEMA WD 6.
1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four minimum) and side wiring from four captively held binding screws.

B. Convenience Receptacles, 125V, 20A: Heavy duty specification grade conforming to the NEMA 5-20R configuration in NEMA WD 6, NEMA WD 1, UL 498, and FS WC-596-F.
1. Subject to compliance with requirements, provide one of the following:
   a. Hubbell; HBL5361 (single), HBL5362 (duplex)
   b. Pass & Seymour; 5361 (single), BR20 (duplex)
   c. Leviton; 5361 (single), 6362 (duplex)
2. Coordinate device and wall plate color with finish specifications.

C. GFCI Receptacles, 125V, 20A: Straight-blade, non-feed through type capability, conforming to NEMA 5-20R configuration in NEMA WD 6, NEMA WD 1, UL 498, UL 943, Class A, and FS WC-596. Include correct wiring/trip indicator light.
1. Convenience duplex; subject to compliance with requirements, provide one of the following:
   a. Hubbell; GF20
   b. Pass & Seymour; 7899
   c. Leviton; 2095
2. Coordinate device and wall plate color with finish specifications.
3. Feed-thru capability may be used with prior written permission of Engineer.

D. Isolated Ground Receptacles, 125V, 20A: Heavy duty specification grade conforming to NEMA 5-20R configuration in NEMA WD 6, NEMA WD 1, UL 498, and FS WC-596.
   1. Convenience duplex; subject to compliance with requirements, provide one of the following:
      a. Hubbell; IG-5362
      b. Pass & Seymour; 13632-IG
      c. Leviton; IG6300
   2. Coordinate device and wall plate color with finish specifications.

## 2.3 WALL SWITCHES

A. General: All switches shall be NRTL listed and conform to NEMA WD 6, NEMA WD 1, UL 20, and FS WS-896-E.

B. Local Wall Switches, 20 Amp 120/277 Volt AC: Extra heavy duty specification grade, toggle-style, back and side wiring. Stainless Steel ground Clip with grounding screw.
   1. Nylon toggle and wall plate
   2. Single Pole; subject to compliance with requirements, provide one of the following:
      a. Hubbell; HBL1221
      b. Pass & Seymour; CSB20AC1
      c. Leviton; 1221-2
   3. Two Pole; subject to compliance with requirements, provide one of the following:
      a. Hubbell; HBL1222
      b. Pass & Seymour; CSB20AC2
      c. Leviton; 1222-2
   4. Three Way; subject to compliance with requirements, provide one of the following:
      a. Hubbell; HBL1223
      b. Pass & Seymour; CSB20AC3
      c. Leviton; 1223-2
   5. Four Way; subject to compliance with requirements, provide one of the following:
      a. Hubbell; HBL1224
      b. Pass & Seymour; CSB20AC4
      c. Leviton; 1224-2
   6. Coordinate device and wall plate color with finish specifications.

C. Pilot Light Switches, 20 Amp: Single pole with neon-lighted handle, illuminated when switch is “off”.
   1. Subject to compliance with requirements, provide one of the following:
      a. Hubbell; HBL 1201PL for 120 and 277 V
      b. Pass & Seymour; PS20AC1RPL for 120 V, PS20AC1RPL7 for 277 V
      c. Leviton; 1221-LH1

## 2.4 WALL PLATES

A. General: Match type to corresponding wiring device.

B. Weatherproof Cover Plates: NEMA 3R, “while-in-use” type, complying with NEMA 250.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Installation shall be in accordance with the NEC and as shown as on the drawings.

B. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the green equipment grounding conductor.

C. Duplex outlets shall be installed with the ground pin up.

D. Provide barriers in multi-gang outlet boxes to separate systems of different voltages, Normal Power and Emergency Power systems, and in compliance with the NEC.

E. Coordinate with other work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other work. Coordinate the electrical work with the work of other trades to ensure that wiring device flush outlets are positioned with box openings aligned with the face of the surrounding finish material. Pay special attention to installations in cabinet work, and in connection with laboratory equipment.

F. Exact field locations of floors, walls, partitions, doors, windows, and equipment may vary from locations shown on the drawings. Prior to locating sleeves, boxes and chases for roughing-in of conduit and equipment, the Lower-tier Subcontractor shall coordinate exact field location of the above items with other trades. In addition, check for exact direction of door swings so that local switches are properly located on the strike side.

G. Mounting Heights: Install wiring devices at the following heights as measured to the center of the device, unless otherwise shown on the drawings.
   1. Wall switches: 48 inches above floor, with the OFF position down.
   2. Wall dimmers: 48 inches above floor.
   3. Convenience receptacles: 18 inches above floor, and 6 inches above counter backsplash or workbenches.
   4. Specific-use receptacles: at heights shown on the drawings.

H. De-rate ganged dimmers as instructed by manufacturer; do not use common neutral.

I. Label receptacles and wall switches per Section 26 05 53 "Identification for Electrical Systems".

J. Test wiring devices for damaged conductors, high circuit resistance, poor connections, inadequate fault current path, defective devices, or similar problems using a portable receptacle tester. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.

K. Test GFCI devices for tripping values specified in UL 1436 and UL 943.

**END OF SECTION**