EXHIBIT 2 – TECHNICAL SPECIFICATIONS

SEE ATTACHED.

2-11-2019

SECTION 01 11 13

WORK COVERED BY CONTRACT DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Definitions.
2. Work Covered by Contract Documents.
3. Cash Allowances.
4. Owner-Furnished Products.
5. Document Management Software.
6. Work Sequence.
7. Work Guidelines.
8. Coordination of Work.
9. Contractors Use of Premises.
10. Contract Clarification.
11. Alternate Construction Methods.
12. Utility Lines.
13. Warranty.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 DEFINITIONS

A. Mobilization Area: For Work at facilities, an area, defined on the Contract Drawings, for Contractor staging and storage of construction equipment, tools, products, and spare parts.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. For Work at facilities, Work of the contract is for the construction of various components at Lake Conroe Office Facility, including but not limited to electrical, lighting, windows, sheetrock, and sealants.

1.6 CASH ALLOWANCES (NOT USED)

1.7 OWNER-FURNISHED PRODUCTS

A. Contractor's Responsibilities:

1. Arrange and pay for product delivery to site.
2. Receive and unload products at site; jointly with Owner's Representative, inspect for completeness or damage.
3. Handle, store, install, and finish products.
4. Repair or replace damaged items.

1.8 DOCUMENT MANAGEMENT SOFTWARE

A. Contractor and the Owner's Representative shall be given the applicable number of Document Management System user names and passwords.

B. Contractor shall use the Owner's internet based document management system to transmit its documents to the Owner's Representative, including but not limited to Requests for Information (RFIs), shop drawing submittals, applications for payment, and letters of correspondence. Refer to Specification Section 01 33 00 – Submittals. The document management software should be able to automatically notify all team members of a submittal upload regardless of the originator, i.e. contractor, Principal Architect/Engineer, Owner's Representative, or Owner. Notification of new uploads should go to all team members regardless if they are the Principal Architect/Engineer or not, i.e. sub-consultants for construction management & inspection, but are not tasked as the Principal Architect/Engineer.

C. A minimum of one (1) and a maximum of three (3) accounts on the document management system will be provided by the Owner. Additional accounts may be requested by the Contractor.

D. Each account will allow one (1) user to access the document management system. Training on the document management system will be provided by the Owner as requested by the Contractor at a mutually agreed upon date and location.

1.9 WORK SEQUENCE

A. Construct Work in phases during the construction period. Coordinate construction schedule and operations with the Owner's Representative. Subcontractors shall coordinate its activities and operations with the Contractor.

B. Construction of this project may require using multiple crews working concurrently in order to complete the project within the specified Contract Time. At no time will multiple crews be allowed to work in consecutive traffic control phases during construction.

C. Due to overall project complexity and numerous active utility interface requirements, submit a sequence of construction of water lines for review by the Owner's Representative. Proposed sequence of construction shall address proposed method and timing of all major construction activities to be undertaken.

D. Data for all facilities and utilities shown were taken from available plans, record drawings, and/or utility maps made available from several sources. Actual field locations of facilities and utilities may vary from that shown on the Drawings. Contractor shall make a complete and independent verification of utility locations prior to submittal of subsequent shop drawings. Unless otherwise approved by the Owner's Representative, work shall not continue at locations where there is a conflict with existing utilities.

E. Construction disturbing traffic shall be conducted during off-peak hours, 9:00 a.m. to 4:00 p.m. weekdays. Coordinate with Owner if working past normal business hours is deemed necessary. Continue work in areas using same construction schedule during consecutive days and/or weekends until work is completed.

1.10 WORK GUIDELINES

A. Maintain access to SJRA facilities and access roads at all times. Coordinate work and schedule with the Owner's Representative, well in advance of commencing the Work in the area(s) of the impacted entities.

B. Hand dig within one (1) foot of underground service lines (public or private).

C. Contractor shall bear the sole responsibility for damage to existing utilities resulting from its construction activities. The Contractor shall be responsible for the repair of damaged utilities, at no additional cost to the Owner.

1.11 COORDINATION OF WORK

A. Coordinate activity schedule and extend full cooperation to other Contractors who have responsibilities either concurrent with, proceeding, or following this project's duration along the work site. Ensure availability of access to selected portions of this project area to others and provide appropriate information for planning purposes to other Contractors. No compensation or time extension will be allowed as a result of conflicting construction activities.

B. Comply with coordination requirements outlined in Specification Section 01 14 19 – Use of Premises.

Contact numbers for such centers are as follows:

1. TESS (Texas) One Call (800) 344-8377.

2. Texas One-Call (800) 245-4545.
3. Texas (Lone Star) One Call (800) 669-8344.

C. Prevent overstress or damage of any structure and any part or member of it during construction. This applies to new and existing facilities, utilities, and structures affected by construction operations. Contractor shall monitor and record the effect of its construction operations on new and existing facilities, utilities and structures and provide engineered temporary supports and connections as required to assure the safety and stability of the same to prevent overstress of any part.

D. Prior to commencing any Work involving state or local agencies, agency stipulated notifications shall be made by the Contractor.

1.12 CONTRACTOR USE OF PREMISES

A. Comply with all requirements outlined in Specification Section 01 14 19 – Use of Premises.

1.13 CONTRACT CLARIFICATION

A. Should clarification of the Contract Documents be requested, request clarification before proceeding with Work by submitting a Request for Information (RFI). Such requests shall be preceded by a diligent investigation of the Contract Documents. Include evidence of such investigation(s) in all requests for clarification.

1.14 ALTERNATE CONSTRUCTION METHODS

A. Alternate construction means and methods will be permitted in accordance with applicable Contract Document details and specification at no additional cost to the Owner. Alternate construction means and methods shall provide a substantial benefit to the project and/or the Owner. Contractor accepts full responsibility for all additional costs of geotechnical investigations and other incidental items, including any re-design that may be necessary to permit the alternate construction means and methods.

1.15 UTILITY LINES

A. All utilities represented on the Drawings are shown as an approximate location and are based on the best information available during project design. Contractor shall field-verify the exact location of all utilities prior to commencing construction. The Contractor shall be responsible for any and all damage to these utilities, caused or resulting from their failure to locate, protect and/or maintain these utilities during construction.

1.16 WARRANTY

A. Comply with the warranty requirements stipulated in Contract Document General Conditions and the warranty requirements of the various specification sections of this project manual.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 19

USE OF PREMISES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for:
    a. Contractor Responsibilities
    b. Temporary Utilities
    c. Limits of Construction
    d. Storage Sheds and Buildings
    e. Working Times
    f. Site Access Times
    g. Notification to Adjacent Occupants
    h. Safety Requirements
    i. First Aid Equipment
    j. Fire Protection
    k. Security Measures
    l. Protection of Utilities, Pipelines, and Property
    m. Surface Restoration
    n. Traffic Control and Use of Public Rights of Way
    o. Contractor’s Roads and Parking
    p. Coordination with Facility Owner’s Operations
    q. Contractor's Field Office
    r. Principal Architect/Engineer's Field Office
    s. Project Photographs
    t. Special Considerations Related to Adjacent Properties and Facilities
    u. Historical and Archaeological Sites

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposing Requirements, Contract Forms, and General Conditions of the Contract.

2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS

A. See Specification Section 01 33 00 – Submittals for the requirements for the mechanics and administration of the submittal process.

B. Contractors Safety Program.

1.4 CONTRACTOR RESPONSIBITIES

A. Comply with applicable requirements specified in other sections of Project Specifications.

B. Comply with procedures for access to the site and Contractor's use of rights-of-way.

C. Maintain and operate temporary construction facilities and temporary systems to assure continuous service of Owner's and other adjacent existing facilities.

D. Modify and extend temporary systems as Work progress requires.

E. Completely remove materials and equipment when no longer required.

F. Restore existing facilities used for temporary services to original or better condition, or as specified.

G. Prior to installation of material, equipment and/or other work, verify with subcontractors, material or equipment manufacturers, and installers that the substrate or surface to which those materials will attach is acceptable for installation of those materials or equipment. (Substrate is defined as any building or construction surfaces to which materials or equipment are attached to, or required prior to installation i.e., floors, walls, ceilings, soils, utilities, site grading, and backfill etc.).

H. Correct unacceptable substrate until acceptable for installation of equipment or materials.

1.5 TEMPORARY UTILITES (NOT USED)

1.6 LIMITS OF CONSTRUCTION

A. Construction operations and storage areas are limited to Owner's property, permanent easements, temporary construction easements (TCE), and/or the Limits of Construction or Construction Limits as indicated on the Contract Drawings.

B. Unauthorized use of areas, or trespassing on land outside of defined limits, is not permitted.

C. Make arrangements, at no cost to the Owner, for Contractor's temporary use of any private properties which may be needed by Contractor for performance of Work. Contractor and Contractor's surety shall indemnify and hold harmless the Owner and Owner's Representatives against claims or demands arising from use of properties outside the Limits of Construction. Submit notarized copy of any separately negotiated agreement(s) between private property owner(s) and Contractor prior to use of area.

D. Where Limits of Construction are shown on Contract Drawings to extend to a property or Right-of-Way line, keep equipment, materials, and stockpiles a minimum of 5 feet from boundary, or existing fence lines.

1.7 STORAGE SHEDS AND BUILDINGS (NOT USED)

1.8 WORKING TIMES

A. Construction shall be conducted during working hours as indicated in Specification Section 00 72 00 – General Conditions of the Contract, unless otherwise amended by a supplemental specification or agreement to the General Conditions of the Contract, and approved by Owner.

1.9 SITE ACCESS TIMES

A. Contractor to coordinate all site access, including deliveries, outside of working hours with Owner's Representative. Neither Owner nor Owner's Representatives shall sign for any Contractor deliveries. Refer to Specification Section 01 65 50 – Product Delivery, Storage, and Handling.

B. Contractor shall coordinate with Owner to not interfere with Owner's facility operations.

1.10 NOTIFICATION OF ADJACENT OCCUPANTS (NOT USED)

1.11 SAFETY REQUIREMENTS

A. Beware of overhead power lines existing in area and in close proximity to project. When 10 feet of clearance between energized overhead power line and construction-related activity cannot be maintained, submit a request to the appropriate utility provider to de-energize or move conflicting overhead power line(s).

B. Submit Contractor's Safety Program in accordance with Specification Section 01 33 00 – Submittals. Include Site Safety and Site Security in accordance with Specification Section 00 72 00 – General Conditions of the Contract.

C. Conduct operations in strict accordance with the Contractor's Safety Program, in accordance with applicable Federal, State, and local safety codes and statutes, and with good construction practice. Establish and maintain

procedures for safety of all work, personnel, and equipment involved in Project.

D. Observe and comply with Texas Occupational Safety Act (Art. 5182a, V.C.S.) and with all safety and health standards promulgated by Secretary of Labor under Section 107 of Contract Work Hours and Standards Act, published in 29 CFR Part 1926 and adopted by Secretary of Labor as occupational safety and health standards under Williams-Steiger Occupational Safety and Health Act of 1970, and to other legislation enacted for safety and health of Contractor employees. Safety and health standards apply to subcontractors and their employees as well as to Contractor and its employees.

E. Observance of and compliance with regulations is solely and without qualification responsibility of Contractor without reliance or superintendence of or direction by the Owner or Owner's Representative. Immediately advise Owner's Representative of investigation or inspection by Federal Safety and Health Inspectors of Contractor or subcontractor's work or place of work on job site under this Contract, and after investigation or inspection, advise Owner's Representative of results. Submit one copy of accident reports to Owner's Representative within 10 days of occurrence.

F. Protect areas occupied by workmen using best available devices for detection of lethal and combustible gases. Test devices frequently to assure functional capability. Constantly observe infiltration of liquids into Work area for visual or odor evidences of contamination, and immediately take appropriate steps to seal off entry of contaminated liquids into Work area.

G. Implement safety measures, including but not limited to safety personnel, first-aid equipment, ventilating equipment, and other safety equipment, as specified or detailed on the Contract Drawings.

H. Maintain required coordination with Police and Fire Departments during entire period covered by Contract.

I. In safety plan, include project safety analysis. Itemize major tasks and potential safety hazards. Plan to eliminate hazards or protect workers and public from each hazard.

1.12 FIRST AID EQUIPMENT

A. Provide first aid kit throughout construction period. List telephone numbers for hospitals, and ambulance services in each first aid kit.

B. Have at least one person thoroughly trained in first aid and cardiopulmonary resuscitation (CPR) procedures present on site whenever Work is in progress. Contractor to conform to protocols and requirements for training and protection against "blood borne pathogens."

1.13 FIRE PROTECTION

A. Conform to specified fire protection and prevention requirements established

by Federal, State, or local governmental agencies and as provided in Contractor's Safety Program.

1.14 SECURITY MEASURES

A. Protect all Work materials, equipment, and property from loss, theft, damage, and vandalism. Perform duty to protect property of the Owner used in connection with performance of Work.

B. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to existing.

1.15 PROTECTION OF UTILITIES, PIPELINES, AND PROPERTY

A. Prevent damage to existing utilities during construction. Utilities shown on Drawings are at approximate locations. Pre-locate, by whatever means may be required (metal detection equipment, probes, excavation, survey), underground utilities. Perform investigative work and repairs required after investigation. Contractor is responsible for damages caused by failure to locate and preserve these underground utilities. Give owners of utilities a minimum of five (5) days' notice before commencing Work in area, for locating utilities during construction and for making adjustments or relocation of utilities when they conflict with proposed Work. Include cost for temporary relocation of utilities necessary to accommodate construction in unit costs for utility construction unless otherwise noted on Drawings. Bypassing of sanitary waste to storm drainage facilities is not allowed. Utility service laterals are not shown on Drawings. Contractor shall anticipate that service lines exist and repair them when damaged due to construction activity. No separate payment will be made for repair work. Include payment in unit prices for work in appropriate sections.

B. Protect and prevent damage to existing crossing, parallel, and adjacent pipelines during construction in accordance with Specification Section 01 11 13 – Work Covered by Contract Documents.

C. Protection of the Work, and Public and Private Property

1. Take precautions, provide programs, and take actions necessary to protect the Work, and public and private property from damage.
2. Do not alter condition of properties adjacent to and along Limits of Construction.
3. Do not use ways, means, methods, techniques, sequences, or procedures that result in damage to adjacent properties or improvements.
4. Restore properties damaged by Contractor outside of designated Limits of Construction at no cost to Owner.
5. Take action to prevent damage, injury, or loss, including, but not limited to, the following:

a. Store materials, supplies, and equipment in orderly, safe manner that will not interfere with progress of Work or work of others.

b. Provide suitable storage for materials subject to damage by exposure to weather, theft, breakage, or otherwise.

c. Place upon Work or any part thereof only safe loads.

d. Frequently clean up refuse, rubbish, scrap materials, and debris created by construction operations, keeping Project site safe and orderly.

6. Assume full responsibility for preservation of public and private property on or adjacent to the Limits of Construction. When direct or indirect damage is done by or on account of any act, omission, neglect, or misconduct in execution of Work by Contractor, restore to condition equal to or better than that existing before damage was done.

7. Perform daily clean up in affected construction areas in order to restore site to existing or better conditions. Areas should be free of debris, scrap material, dirt, mud, and other items identified by Owner's Representative. Do not leave buildings, roads, streets, or other construction areas unclean. If deemed necessary by the Owner's Representative, Contractor shall employ street sweeping/cleaning equipment to maintain area streets. Such services shall be identified as a separate line item in the Contractor's Schedule of Values (SOV), and payment shall be based upon the Owner's approval of effectiveness and frequency of provided services.

D. Protection of Existing Structures:

1. Underground Structures:

a. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, manholes, boxes, chambers, electrical signal and communication conduits, tunnels, and other existing subsurface installations located within or adjacent to limits of Work.

b. Locate and protect private lawn sprinkler systems which may exist within site. Repair or replace damaged systems to condition existing at start of Work, or better.

c. If permanent relocation of underground structures or other subsurface installations is required and not otherwise provided in Contract, the Owner will direct Contractor in writing to perform Work, which is paid for under provisions for changes as described in Specification Section 00 72 00 - General Conditions of the Contract.

2. Surface Structures: Surface structures are defined as existing buildings, structures and other constructed installations above ground surface. Included with structures are their foundations and any extensions below the surface. Surface structures include, but are not limited to buildings, tanks,

walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities visible above ground surface.

3. Protection of Underground and Surface Structures:

   a. Support in place and protect from direct or indirect damage underground and surface structures located within or adjacent to limits of Work.

   b. Prevent overstress or damage to any structure and any part or member of structures during construction. This applies to new and existing facilities, utilities, and structures affected by construction operations. Contractor shall monitor and record the effect of its construction operations on new and existing facilities, utilities, and structures, and shall provide engineered temporary supports and connections as required to assure the safety and stability of the structures and prevent overstress of any part.

   c. Install temporary supports carefully and as required by party owning or controlling structure. Before installing structure supports, satisfy Owner's Representative that methods and procedures have been approved by owner of structure.

   d. Assume risks attending presence or proximity of underground and surface structures within or adjacent to Work including but not limited to damage and expense for direct or indirect damage caused by Contractor's Work to structure. Immediately repair damage.

4. Protection of Trees/Shrubs:

   a. Contractor to take all necessary measures to prevent any damage to trees/shrubs within or adjacent to limits of Work.

   b. Contractor shall install orange fencing around all trees Owner deems necessary.

E. Protection of Installed Products:

1. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to final completion of Work.

2. Provide coverings to protect equipment and materials from damage. Cover projections, wall corners, jambs, sills, and exposed sides of openings in areas used for traffic and passage of materials in subsequent work.

1.16 SURFACE RESTORATION

A. Restore site to the condition which existed before construction, unless otherwise noted in Contract Documents.

1.17 TRAFFIC CONTROL AND USE OF PUBLIC RIGHTS OF WAY (NOT USED)

1.18 CONTRACTORS ROADS AND PARKING

A. Prevent interference with traffic on existing roads.

B. Designate temporary parking areas to accommodate Contractor's and Owner's Representative personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by Owner's Representative.

C. Minimize use by construction traffic of existing streets and driveways.

D. Do not inhibit the ability of the Owner's personnel to access, operate, and maintain existing facilities during construction.

1.19 COORDINATION WITH FACILITY OWNER'S OPERATIONS

A. Definition: A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, piping, or conduit, has to be temporarily suspended or taken out of service to perform the Work.

B. Work that may interrupt normal operations shall be accomplished at times convenient to, and approved by Owner.

C. Except for necessary shutdowns, perform the Work such that Owner's facilities remain in continuous satisfactory operation during the Project. Schedule and conduct the Work such that the Work does not:

1. Impede Owner's production or processes,
2. Create potential hazards to public health or wellbeing,
3. Create potential hazards to operating equipment and personnel,
4. Reduce the quality of Owner's facilities' product(s) or effluent, or
5. Cause odors or other nuisances.

D. Coordinate shutdowns with Owner. When possible, combine activities into a single shutdown to minimize impacts on Owner's operations and processes.

E. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.

F. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor.

G. Shutdowns of Electrical Systems: Comply with Laws and Regulations, including the National Electric Code. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before shutdown Work is started. Upon completion of shutdown Work, remove the locks and tags and notify Owner that facilities are available for use.

1.20 CONTRACTOR'S FIELD OFFICE (NOT USED)

1.21 PRINCIPAL ARCHITECT/ENGINEER'S FIELD OFFICE (NOT USED)

1.22 PROJECT PHOTOGRAPHS

A. Refer to Specification Section 01 32 36.01 – Project Photographs

1.23 SPECIAL CONSIDERATIONS RELATED TO ADJACENT PROPERTIES AND FACILITIES

A. Contractor shall be responsible for negotiations of any waivers or alternate arrangements required to enable transportation of materials to the site.

B. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.

1. Provide daily sweeping of hard-surface roadways to remove soils tracked onto roadway.

1.24 HISTORICAL AND ARCHAEOLOGICAL SITES (NOT USED)

1.25 WARRANTY (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 MAINTENANCE (NOT USED)

3.2 OWNER TRAINING (NOT USED)

END OF SECTION

SECTION 01 25 13

PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. The procedure for requesting the approval of substitution of a product that is not equivalent to a product which is specified by descriptive or performance criteria or defined by reference to one or more of the following:

   a. Name of manufacturer.

   b. Name of vendor.

   c. Trade name.

   d. Catalog number.

2. Substitutions are not "or-equals".

3. This Specification Section does not address substitutions for major equipment.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.

2. Division 01 – General Requirements.

C. Request for Substitution – General:

1. Base all bids on materials, equipment, and procedures specified.

2. Certain types of equipment and kinds of material are described in specifications by means of references to names of manufacturers and vendors, trade names, or catalog numbers.

   a. When this method of specifying is used, it is not intended to exclude from consideration other products bearing other manufacturer's or vendor's names, trade names, or catalog numbers, provided said products are "or-equals," as determined by Owner’s Representative.

3. Other types of equipment and kinds of material may be acceptable substitutions under the following conditions:

   a. Or-equals are unavailable due to strike, discontinued production of products meeting specified requirements, or other factors beyond control of Contractor; or,

b. Contractor proposes a cost and/or time reduction incentive to the Owner.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE

A. In making request for substitution or in using an approved product, Contractor represents Contractor:

1. Has investigated proposed product, and has determined that it is adequate or superior in all respects to that specified, and that it will perform function for which it is intended.
2. Will provide same guarantee for substitute item as for product specified.
3. Will coordinate installation of accepted substitution into Work, to include building modifications if necessary, making such changes as may be required for Work to be complete in all respects.
4. Waives all claims for additional costs related to substitution which subsequently arise.

1.5 DEFINITIONS

A. Product: Manufactured material or equipment.

1.6 PROCEDURE FOR REQUESTING SUBSTITUTION

A. Substitution shall be considered only:

1. After award of Contract.
2. Under the conditions stated herein.

B. Written request through Contractor only.

C. Transmittal Mechanics:

1. Follow the transmittal mechanics prescribed for Shop Drawings in Specification Section 01 33 00 – Submittals.

a. Product substitution will be treated in a manner similar to "deviations," as described in Specification Section 01 33 00 – Submittals.

b. List the letter describing the deviation and justifications on the transmittal form in the space provided under the column with the heading DESCRIPTION.

1) Include in the transmittal letter, either directly or as a clearly marked attachment, the items listed in the following paragraph below.

D. Transmittal Contents:

1. Product identification:
   a. Manufacturer's name.
   b. Telephone number and representative contact name.
   c. Specification Section or Drawing reference of originally specified product, including discrete name or tag number assigned to original product in the Contract Documents.
2. Manufacturer's literature clearly marked to show compliance of proposed product with Contract Documents.
3. Itemized comparison of original and proposed product addressing product characteristics including but not necessarily limited to:
   a. Size.
   b. Composition or materials of construction.
   c. Weight.
   d. Electrical or mechanical requirements.
4. Product experience:
   a. Location of past projects utilizing product.
   b. Name and telephone number of persons associated with referenced projects knowledgeable concerning proposed product.
   c. Available field data and reports associated with proposed product.
5. Data relating to changes in construction schedule.
6. Data relating to changes in cost.
7. Samples:
   a. At request of Owner’s Representative.
   b. Full size if requested by Owner’s Representative.
   c. Held until substantial completion.
   d. Owner’s Representative not responsible for loss or damage to samples.

1.7 APPROVAL OR REJECTION

A. Written approval or rejection of substitution given by the Owner’s Representative, Principal Architect/Engineer, and the Owner.

B. Owner's Representative reserves the right to require proposed product to comply with color and pattern of specified product if necessary to secure design intent.

C. In the event the substitution is approved, the resulting cost and/or time reduction will be documented by Change Order in accordance with the General Conditions.

D. Substitution will be rejected if:

1. Submittal is not through the Contractor with his stamp of approval.
2. Request is not made in accordance with this Specification Section.
3. In Owner's Representative opinion, acceptance will require substantial revision of the original design.
4. In the Owner's Representative opinion, substitution will not perform adequately the function consistent with the design intent.

E. Contractor shall reimburse Owner for the cost of the Owner's Representative evaluation whether or not substitution is approved.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 26 63

CHANGE ORDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

Procedures for processing Change Orders, including:

1. Quality Assurance.
2. Responsible Individual.
3. Documentation of Change in Contract Price and Contract Time.
4. Change Procedures.
5. Proposals and Contract Modifications.
6. Work Change Directive.
7. Change Order.
8. Execution of Change Documentation.
9. Correlation of Contractor Submittals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT (NOT USED)

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. Equipment Rental Rates: equipmentwatch.com. Rental Rate is defined as full unadjusted base rental rate for appropriate item of construction equipment.

1.5 RESPONSIBLE INDIVIDUAL

A. Provide letter to the Owner's Representative indicating name, title, address and contact information of individual authorized to execute change documents and who is responsible for informing others in Contractor's employ and Subcontractors of changes to the Work. Information should be provided at the Preconstruction Conference but, no later than 10 calendar days following the Preconstruction Conference.

1.6 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Maintain detailed records of changes in Work. Provide full information required for identification and evaluation of proposed changes, and substantiate costs of changes in Work.

B. Document each proposal for change in cost or time with sufficient data to allow evaluation of proposal. Provide additional information upon request of the Owner or the Owner's Representative.

C. Proposals shall include the following minimum information:

1. Quantities of items in original Proposal with additions, reductions, deletions, and substitutions.
2. Quantities and cost of items in original schedule of values with additions, reductions, deletions, and substitutions.
3. Provide unit prices for items not included in original Proposal with supporting information when absent from original Proposal Work.
4. Justification for changes in Contract Time.
5. Additional data upon request.

D. For changes in Work performed on a time-and-materials basis, provide the following additional information:

1. Quantities and description of products and equipment.
2. Taxes, insurance and bonds.
3. Overhead and profit as noted in Document 00 72 00 - General Conditions, Article 11.5.
4. Dates, times, and by whom work was performed.
5. Time records and certified copies of applicable payrolls.
6. Invoices, receipts for products, rented equipment, and subcontracts, similarly documented.

E. For changes in Work performed on a time-and-materials basis, payment for rental equipment will be as follows:

1. Actual invoice cost for duration required to complete extra work without markup for overhead and profit. When extra work comprises only a portion of rental invoice where equipment would otherwise be on site, compute hourly equipment rate by dividing the actual monthly invoice by 176. (One day equals 8 hours and 1 week equals 40 hours.)
2. Do not exceed estimated operating costs given on equipmentwatch.com website for items of equipment. Overhead and profit will be allowed on operating cost.

F. For changes in Work performed on a time-and-materials basis using Contractor-owned equipment, use equipmentwatch.com rates as follows:

1. Contractor-owned equipment will be paid at Rental Rate for duration of time required to complete extra work without markup for overhead and profit. Utilize lowest cost combination of hourly, daily, weekly, or monthly rates. Use 150 percent of Rental Rate for double shifts (one extra shift per day) and 200 percent of Rental Rate for more than two shifts per day. Standby rates shall be 50 percent of appropriate Rental Rate shown on equipmentwatch.com website. No other rate adjustments apply.
2. Do not exceed estimated operating costs given on equipmentwatch.com. Overhead and profit will be allowed on operating cost. Operating costs will not be allowed for equipment on standby.

1.7 CHANGE PROCEDURES

A. Changes to Contract Price or Contract Time can only be made by issuance of Change Order. Issuance of Work Change Directive will be formalized into a Change Order. Changes will be in accordance with requirements of the General Conditions.

B. The Owner's Representative will advise of minor changes in Work not involving an adjustment to Contract Price or Contract Time as authorized by the General Conditions by issuing supplemental instructions.

C. Request clarification of Drawings, Specifications, Contract Documents, or other information by using Request for Information. Response by the Owner's Representative to Requests for Information does not authorize Contractor to perform tasks outside scope of Work. Changes must be authorized as described in this section.

1.8 PROPOSALS AND CONTRACT MODIFICATIONS

A. The Owner or the Owner's Representative may issue a Request for Proposal (RFP), which includes detailed description of proposed change with supplementary or revised Drawings and Specifications. The Owner or the Owner's Representative may also request a proposal in response to a Request for Information. Prepare and submit proposal within 7 days or as specified in the request.

B. Submit request for Contractor changes to Owner's Representative describing proposed change and its full effect on Work, with a statement describing reason for change and effect on Contract Price and Contract Time including full documentation.

C. The Owner may use the Principal Architect/Engineer to review Change Orders.

1.9 WORK CHANGE DIRECTIVE

A. The Owner may issue a signed Work Change Directive instructing Contractor to proceed with a change in Work. Work Change Directive will subsequently be incorporated in Change Order.

B. Document will describe changes in Work and designate method of determining change in Contract Price or Contract Time.

C. Proceed promptly to execute changes in Work in accordance with Work Change Directive.

1.10 CHANGE ORDER

A. Stipulated Price Change Order

1. Stipulated Price Change Order will be based on accepted proposal.

B. Unit Price Change Order

1. Where Unit Prices for affected items of Work are included in Proposal, unit price Change Order will be based on unit prices, subject to the General Conditions.
2. Where unit prices of Work are not pre-determined in Proposal, Work Change Directive or accepted proposal will specify unit prices to be used.

C. Time-and-Material Change Order

1. Provide itemized account and supporting data after completion of change, within time limits indicated for claims in the General Conditions.
2. The Owner will determine change allowable in Contract Price and Contract Time as provided in the General Conditions.
3. Maintain detailed records of work done on time-and-material basis as specified in paragraph 1.4, Documentation of Change in Contract Price and Contract Time.
4. Provide full information required for evaluation of changes and substantiate costs for changes in Work.

1.11 EXECUTION OF CHANGE DOCUMENTATION

A. The Owner or the Owner's Representative will issue Change Orders, Work Change Directives, or accepted proposal for signatures of parties as described in the General Conditions.

1.12 CORRELATION OF CONTRACTOR SUBMITTALS

A. For Stipulated Price Contracts, promptly revise Schedule of Values and Application for Payment forms to record authorized Change Orders as separate line item.

B. For Unit Price Contracts, next monthly estimate of Work after acceptance of a Change Order will be revised to include new items not previously included and appropriate unit rates.

C. Promptly revise progress schedules to reflect change in Contract Time, and to adjust time for other items of work affected by change, and resubmit for review.

D. Promptly enter changes to on-site and record copies of Drawings, Specifications, or Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 29 73

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Measurement and Payment
2. Definition
3. Preparation
4. Submittal

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS

A. Submit Schedule of Values in accordance with requirements of Section 01 33 00 – Submittals. Submit at least 10 days prior to submitting first application for progress payment. Submit via SharePoint.

B. Revise Schedule of Values and resubmit for items affected by contract modifications, Change Orders, and Work Change Directives. After changes are reviewed without exception by Authority's Principal Architect/Engineer, make submittal at least 10 days prior to submitting next application for progress payment.

1.4 DEFINITIONS

A. Schedule of Values: Is a schedule, prepared and maintained by the Contractor, allocating portions of the Contract Amount to various portions of the Work, including a tabulation of all of the costs of the various Subcontracts and materials which in the aggregate make up the Cost of the Work. The Schedule of Values shall be subject to Owner's approval and, after such approval, be used as the basis for reviewing the Contractor's Application For Payment.

B. Break down costs to list major products or operations for each line item which has an installed value of more than $5000.

1.5 PREPARATION

A. For stipulated price contracts, subdivide Schedule of Values into logical portions of Work, such as major work items or work in contiguous geographic areas.

B. Schedule and Schedule of Values shall be developed together. At a minimum, the Schedule of Values shall be broken out by trade and split between materials and labor as approved by the Owner. Such Prices will include overhead and profit applicable to each item of work.

C. For lump sum equipment items where submittal of operation/maintenance data and testing are required, include separate item for equipment operation and maintenance data submittal valued at 5 percent of lump sum amount for each equipment item and separate item for testing and adjusting valued at 5 percent of lump sum amount for each equipment item.

D. Round off figures for each listed item to nearest $100 except for value of one item, when necessary, to make total of items in Schedule of Values equal Contract Price for stipulated price contracts or lump sum amount in Schedule of Unit Price Work.

E. Submit Schedule of Values in approved electronic spreadsheet, formatted to print on 11” x 17” paper, to the Owner’s Document Management System.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Specific requirements for the preparation, submittal, updating, status reporting and management of the construction Progress Schedule.

B. Provide Construction Schedules for Work included in Contract in accordance with requirements in this Section. Create Construction Schedule using Critical Path Method (CPM) computer software capable of mathematical analysis of Precedence Diagramming Method (PDM) plans. Provide printed activity listings and bar charts in formats described in this Section.

C. Combine activity listings and bar charts with narrative report to form Construction Schedule submittal for Owner and the Owner's Representatives.

D. Related Specification Sections include, but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms and Conditions of the Contract.

2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost of construction scheduling in overhead cost for this project.

1.3 SCHEDULING STAFF

A. Employ or retain services of individual experienced in critical path scheduling for duration of Contract. Individual shall cooperate with Owner's Representative and shall update schedule (Progress Schedule) monthly as required by the Contract's General Conditions, to indicate current status of Work.

1.4 QUALITY ASSURANCE

A. The person preparing and revising the construction Progress Schedule shall be experienced in the preparation of schedules of similar complexity.

B. Within five (5) days from award of the Contract, Contractor shall submit to Owner's Representative the name of the person responsible for the preparation, maintenance, updating and revision of all schedules.

1. Qualifications necessary:

a. At least five (5) years verifiable experience in the preparation and updating of complex construction schedules for projects of similar type, size and complexity.

b. Proficient in the use of Microsoft© Project® 2007.

1.5 DEFINITIONS

A. The following definitions shall apply to this Specification Section:

1. BASELINE SCHEDULE: The initial as-bid, detailed, cost and resource loaded Progress Schedule prepared by the Contractor to define its plan for constructing the Project as required by the Contract Documents, and accepted by the Owner or Owner's Representative as meeting the requirements of the Contract Documents for specified constraints, sequences, milestones and completion dates.
2. PROGRESS SCHEDULE: The initially accepted Baseline Schedule, or subsequently approved Revised Baseline Schedules, updated each month to reflect actual start and finish dates of schedule activities and all time impact events whether caused by Contractor or Owner or factors beyond the control of either party.
3. REVISED BASELINE SCHEDULE: The initially accepted Baseline Schedule revised to reflect only approved changes.
4. WORKING SCHEDULE: A schedule developed from the Progress Schedule, utilizing scheduling software features not allowed for Baseline and Progress Schedules at the Contractor's sole discretion, to indicate the Contractor's plan for executing the Work, and providing for schedule recovery when approved time extensions are not sufficient to provide for timely completion due to Contractor inefficiencies beyond the control of the Owner or outside the risks accepted by the Owner.

1.6 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Scheduler qualifications.
3. Baseline Schedule: Submitted within 30 days after Effective Date of Agreement.
4. Monthly Progress Schedules.
5. Revised Baseline Schedules.
6. Working Schedules.
7. Look-Ahead Schedules.

1.7 GENERAL REQUIREMENTS

A. Contractor shall prepare and submit Baseline and Progress Schedules and updates and revisions to them as specified herein.

1. All scheduling to be performed in Microsoft© Project® 2007.

2. The Baseline and Progress Schedules shall be a calendar day-based and cost-loaded Critical Path Method (CPM) network diagram with supporting data.

B. Disallowed Scheduling Software Features:

1. The following specific features are not allowed to be applied in the Baseline and Progress Schedules:

a. Resource leveling.

b. Activity or event constraints, other than those specified by the Contract Documents.

c. Leads and lags:

1) Create specific activities with specific durations in-lieu-of leads and lags.

2) Durations shall have positive values.

d. Default progress data:

1) Start and finish dates shall not be automatically updated.

2) Update with actual start and finish dates documented from field reports.

3) Work activities shall be updated by actual Work progression, not cash flow driven.

4) Updating of activity percent complete and remaining duration shall be independent functions, not one parameter calculated from the other.

5) Out-of-sequence progress shall be accounted for through retained logic, not a default option of progress override.

e. Multiple calendars.

2. Any float suppression techniques or other software features that corrupts the pure mathematical model calculating the critical path.

a. The following CPM schedule outputs will be rejected without further review:

1) Schedules indicating the start of the critical path at a date point or activity beyond the date of Notice to Proceed, or schedules indicating a discontinuous critical path from Notice to Proceed to Contract completion.

2) Schedules defining critical activities as those on a path or paths having some minimum value of float.

3) Schedules with multiple critical paths.

4) Schedules indicating a completion date beyond the contractual completion date.

3. Contractor, at Contractor's sole discretion, may employ the disallowed scheduling software features for Contractor's exclusive use in preparing a Working Schedule.

C. Float Time:

1. Neither the Owner nor the Contractor owns the float; the project owns the float.
2. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date.

D. By preparing and submitting the Baseline Schedule, the Contractor represents that it can and intends to execute the Work and portions thereof within the specified times and constraints and that its bid covers the costs associated with the execution of the Work in accordance with the Construction Schedule.

E. Contractor shall provide an electronic copy on CD media for the Baseline Schedule and Progress Schedule and all monthly updates of both to accompany hard copies of the schedules and tabular reports.

1. Electronic submittal shall be in a format compatible with Microsoft© Project® 2007.
2. Contractor shall provide with the schedules, a procedural outline of the system shut-downs and proposed tie-ins, and the Owner's O&M staff, which shall be subject to approval of the Owner.

1.8 SUBMITTAL PACKAGES

A. Baseline Schedule:

1. CPM time-scaled network diagram:
   a. Three (3) prints of each sheet.
   b. Minimum sheet size: 11 IN x 17 IN.
   c. Provide electronic format (CD-ROM).
2. Supporting data:
   a. Three (3) sets of a list of project activities including the following:
      1) Holidays that will be observed during construction.
      2) Number of planned working days and shifts per week.

B. Monthly updates that include the following:

1. Narrative Schedule Report.
2. Revised Baseline Schedule as appropriate.
   a. Update to reflect approved Change Orders occurring since the prior update.

b. If no new approved Change Orders since prior update, provide a narrative report indicating such, and acknowledging the pertinence of the previously approved Baseline Schedule.

3. Updated Progress Schedule.
4. Explanation of changes in logic, duration of activities.
5. The number of opaque reproductions which Contractor requires, plus three (3) copies which will be distributed by the Owner's Representative.
   a. Do not submit fewer than three (3) copies.
6. Provide electronic format (CD-ROM).

C. Look-Ahead Rolling Schedule:
1. A four-week rolling schedule shall be provided by the Contractor at each progress meeting.
   a. The schedule shall provide an accurate representation of the work performed the previous week and work planned for the current week and subsequent two (2) weeks.
2. The schedule shall be provided in a tabular format with bars representing work duration.
   a. The schedule shall refer to activity ID numbers on the Baseline and Progress Schedules.
   b. Activities that are on the critical path and activities that are behind schedule shall be noted by color, highlight, or underscore.
3. Derived from the Working Schedule, if applicable.

D. Narrative Schedule Report:
1. Schedule reports for Initial Baseline and Revised Baseline Schedules shall include the following minimum data for each activity:
   a. Preceding and succeeding activities.
   b. Activity description and number.
   c. Durations of activities:
      1) Original durations.
      2) Remaining durations.
   d. Earliest start date (by calendar date).
   e. Earliest finish date (by calendar date).
   f. Actual start date (by calendar date).
   g. Actual finish date (by calendar date).
   h. Latest start date (by calendar date).
   i. Latest finish date (by calendar date).

j. Float.

k. Percentage of activity completed.

l. Activity constraints specified by the Contract Documents.

m. Type of Tabulation (Initial or Updated).

n. Project Duration.

o. Project Contractual Completion Date.

p. The date of commencement of the Work as stated in the Notice to Proceed.

q. If an updated (revised) schedule, cite the new project completion date and project status and date of revision.

2. Shall be organized in the following sequence with all applicable documents included:

a. Contractor's transmittal letter.

b. Work completed during the period.

c. Identification of unusual conditions or restrictions regarding labor, equipment or material.

d. Description of the current critical path.

e. Changes to the critical path and scheduled completion date since the last schedule submittal.

f. Description of problem areas.

g. Current and anticipated delays:

1) Cause of delay.

2) Impact of delay on other activities, milestones and completion dates.

3) Corrective action and schedule adjustments to correct the delay.

h. Pending items and status thereof:

1) Permits.

2) Change orders.

3) Time adjustments.

4) Non-compliance notices.

i. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

1.9 START-UP, DEMONSTRATION, TRAINING, AND FINAL COMPLETION

A. The Baseline Schedule must include broad-based activities for start-up, operator training, and final completion.

1. The Baseline Schedule may not necessarily contain sufficient detail on all activities listed in Specification Section 01 75 00 – Facility Start Up for start-up and demonstration.
2. At least 90 days prior to any activities, submit a detailed schedule in conformance with the requirements of Specification Section 01 75 00 – Facility Start Up:
   a. Identify task for the substantial completion notification.
   b. Pre-demonstration period:
      1) Identify equipment start-up for all major equipment.
      2) Identify all operator trainings required by individual Specification Sections.
      3) Complete submission of all required submittals.
   c. Demonstration period: Identify the demonstration period for each project classified system.

1.10 SCHEDULING CONFERENCE

A. Contractor shall schedule and Owner's Representative will conduct a scheduling conference with Contractor's project manager and construction scheduler.
   1. Conference must take place within 10 business days after the Preconstruction Conference.
   2. Owner's Representative will review the requirements of this Specification Section and other specified scheduling and sequencing requirements with Contractor.
   3. Baseline Construction Schedule:
      a. Provide five (5) copies of a Baseline Schedule in the form of an arrow or precedence diagram covering the following project phases and activities:
         1) Schedule of Submittals of Shop Drawings and schedule dates for fabrication and delivery of key and long lead time items.
         2) Contractor's submittal information shall show intended submittal dates and shall include, as a minimum, the maximum allowable review period.
         3) The information shall provide sufficient durations for reasonable administration of re-submittals, fabrication and transportation to produce realistic delivery dates for those procurement items.
   4. Owner's Representative shall review the schedule and provide comments.
   5. Provide approval of the schedule or request a meeting to review the schedule with Contractor within seven (7) days of receipt of the schedule.

6. If requested, Contractor shall participate in a review and evaluation of the schedule with Owner's Representative.
7. Any revisions necessary as a result of this review shall be resubmitted for review by Owner's Representative within five (5) business days.

B. Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations.
   1. Contractor shall be prepared to discuss the proposed work plan and schedule methodology that comply with the Contract requirements.
   2. If Contractor proposes deviations to specified construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts.
   3. Contractor shall be prepared to discuss the proposal.

C. Contractor shall provide the Preliminary Schedule of Values for the work to be performed.
   1. This document must match the total quantities and costs associated with the scheduled tasks.

D. Owner's Representative will review the logic diagram, WBS coding structure, and activity identification system, and provide required Baseline Schedule changes to Contractor for implementation within seven (7) days following the Conference.

E. Scheduling Conference (are required on a weekly basis until agreement to the Baseline Schedule is reached.
   1. Contractor to provide copies of the revised schedule.
   2. Contractor to address specific comments from the previous meeting.
   3. Contractor to revise the narrative as required.

1.11 BASELINE SCHEDULE

A. Schedule shall include, but not be limited to, activities that show the following that are applicable to the project:
   1. Project characteristics, salient features, or interfaces, including those with outside entities that could affect time of completion.
   2. Project start date, scheduled completion date and other milestones.
   3. Work performed by Contractor, subcontractors and suppliers.
   4. Submittal development, delivery, review and approval, including those from Contractor, subcontractors and suppliers.
   5. Procurement, delivery, installation and testing of materials, plants and equipment.
   6. Finish work and final cleanup.

7. Project float as the predecessor activity to the scheduled completion date.

B. Schedule shall have not less than 10 activities, unless otherwise authorized by the Owner's Representative.

1. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.
2. Schedule activities shall include the following:
   a. A clear and legible description.
   b. Start and finish dates.
   c. A duration of not less than one (1) working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Owner's Representative.
   d. At least one (1) predecessor and one (1) successor activity, except for project start and finish milestones.
   e. Required constraints: Only contractually required constraints may be inserted into the Baseline Schedule.
   f. Codes for responsibility, stage, work shifts, location and contract pay item numbers.

C. Early Completion Time:

1. Contractor may show early completion time on any schedule provided that the requirements of the contract are met.
2. Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned.

D. Working durations shall be planned to incorporate the effects of normal weather impacts. See General Conditions Article 12.2 for the "Baseline Rain Day Determination".

1.12 PROGRESS SCHEDULE

A. Develop Progress Schedule based on approved Baseline and Revised Baseline Schedules.

1. All restrictions on use of constraints, leads and lags, resource leveling, etc., shall also apply to Progress Schedules.

B. The Progress Schedule will be updated once per month for monitoring progress.

1. Contractor may submit one (1) additional update per month for its own convenience.

C. Indicate progress by making entries on the most recently accepted version of the network diagram and supporting data to show:

1. Activities completed.
2. Activities started.
3. Remaining duration for each activity started but not yet completed.
4. Percent complete based on value of work in place and value of equipment or material delivered and properly stored.
5. Status of activity due to be completed by the next scheduled progress meeting.

D. Computerized Progress Schedule and percent completion of Work shall be used to verify Contractor's payment requests.

1. Progress payments will not be processed by the Owner's Representative unless the updated Progress Schedule has been submitted concurrently with a pay request and found acceptable by the Owner's Representative.

1.13 REVISIONS TO PROGRESS SCHEDULE

A. Contractor shall submit data for a revised Progress Schedule within five (5) days of the occurrence of any of the following:

1. When contractor-caused delay in completion of any activity or group of activities indicates an overrun of the Contract Time or Control Dates by 30 working days or 10 percent of the remaining duration, whichever is less.
2. When delays in submittals, deliveries, or work stoppages are encountered making necessary the replanning or rescheduling of the Work.
3. When the schedule does not represent the actual progress of the Work.
4. When a change order significantly affects the contract completion date.

B. The revised Progress Schedule shall be the basis of a Working Schedule showing:

1. How Contractor intends to return to schedule.
2. How Contractor intends to avoid falling behind schedule on future activities.

C. Show changes on the network diagram and supporting data including:

1. New activities and their duration.
2. Modifications to existing activities.

D. Provide written narrative report as needed to define:

1. Problem areas, anticipated delays, and impact on the current schedule.
2. Corrective action recommended, and its effect.
3. Major changes in scope.
4. Revised projections of progress and completion.

E. Except as provided in the following subparagraphs 1 and 2, the cost of revisions to the Progress Schedule resulting from changes in the Work shall be included

in the cost for the change in the Work, and shall be based on the complexity of the revision or Change Order, man-hours expended in analyzing the change, and the total cost of the change.

1. The cost of revision to the Construction Schedule not resulting from authorized changes in the Work shall be the responsibility of the Contractor.
2. The cost of revision to the Construction Schedule for the Contractor's convenience shall be the responsibility of the Contractor.

F. The revised network diagram and supporting data for the Progress Schedule shall be submitted to the Owner's Representative upon completion of the revisions, but not later than the next progress meeting.

G. Revisions to the Progress Schedule for the Contractor's convenience:

1. Must be approved by the Owner's Representative before Contractor changes the sequence of Work.

1.14 TIME IMPACT ANALYSIS (TIA)

A. The accepted initial Baseline Schedule or subsequently accepted Revised Baseline Schedule shall be used for TIA.

B. Contractor shall submit a written TIA to the Owner's Representative with each request for adjustment of Contract Time, or when Contractor or Owner's Representative consider that an approved or anticipated change may impact the critical path or contract progress.

1. The TIA must be attached to any change order prior to approval of any change to time or cost.

C. The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate.

1. The analysis shall use the Baseline or Revised Baseline Schedule (accepted Baseline Schedule) that has a data date closest to and prior to the event.
2. If the Owner's Representative determines that the accepted Baseline Schedule used does not appropriately represent the conditions prior to the event, the accepted Baseline Schedule shall be updated to the day before the event being analyzed.
3. The TIA shall include an impact schedule developed from incorporating the event into the accepted Baseline Schedule by adding or deleting activities, or by changing durations or logic of existing activities as appropriate to the nature of the change event.
4. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted Baseline Schedule, the difference between scheduled completion dates of the two (2) schedules shall be equal to the adjustment of Contract Time.

D. Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Owner's Representative.

1. Contractor shall allow the Owner's Representative two (2) weeks after receipt to approve or reject the submitted TIA.
2. All approved TIA schedule changes shall be shown on the next update schedule.

E. In the event of a TIA rejection:

1. If a TIA submitted by the Contractor is rejected by the Owner's Representative, the Contractor shall meet with the Owner's Representative to discuss and resolve issues related to the TIA.
2. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Owner's Representative to give notice.
3. Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules.
4. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule.
5. Owner's Representative will withhold remaining payment on the schedule contract item if a TIA is requested by Owner's Representative and not submitted by Contractor within 15 working days.
6. The schedule item payment will resume on the next estimate after the requested TIA is submitted.

a. No other contract payment will be retained regarding TIA submittals.

1.15 NARRATIVE SCHEDULE REPORT

A. Narrative Schedule Report shall list Activities Started This Month; Activities Completed This Month; Activities Continued This Month; Activities Scheduled To Start or Complete Next Month; Problems Encountered This Month; Actions Taken to Solve These Problems.

B. Narrative Schedule Report shall describe changes made to Construction Schedule Logic (i.e., changes in Predecessors and Lags); Activities Added to Schedule; Activities Deleted from Schedule; any other changes made to Schedule other than addition of Actual Start Dates and Actual Finish Dates and changes of Data Date and Remaining Durations for recalculation of mathematical analysis.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 32 36.01

PROJECT PHOTOGRAPHS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Technical and submittal requirements for project photographs, including:

   a. Measurement and Payment

   b. Project photographs for facility and pipeline projects. Facility projects may have one or more distinct sites. Pipeline projects may have more than one segment but are usually linear in nature, such as waterline or wastewater line projects.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.

2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 DEFINITIONS:

1. Pre-construction Photographs: Photographs taken, in sufficient numbers and detail, prior to beginning field activities, to show original construction site conditions.

2. Progress Photographs: Photographs, taken throughout the duration of construction at regular intervals from vantage points, approved by the Owner's Representative, that document progress of the Work.

3. Completed Project Photographs: Photographs, taken by a commercial photographer, which are suitable for framing and for use in brochures or on the Internet.

1.4 SUBMITTALS:

1. Refer to Section 01 33 00 – Submittals.

2. Format and Media. Digital photography shall be used for Preconstruction and Progress Photographs. Digital or film photography may be used for Completed Project Photographs. Submit digital Joint Photographic Experts Group (JPEG) images for electronic submittals.

a. Media

1) Digital Photography. Use at least 6.0 megapixel density for photographs. Submit digital photographic files on compact disks (CD) in JPEG format. Submit disks in 3-hole punched plastic sheets with a maximum of two CD's per sheet. Mark disks with project name and dates of photos.

3. Submittal Quantities and Frequencies

a. Preconstruction photographs:

1) For Facility Projects, multiple photographs shall be taken of the project site to document existing facilities, parking areas, driveways, surface features such as building, trees and other vegetation or landscaping. This shall be accomplished through the use of a 100 foot interval grid (50 foot grid for sites less than 1 acre) imposed on the site with photos taken at each node point along the grid lines (4 photos per node) or by other means as approved by the Owner's Representative.

b. Progress Photographs: Submit one set of digital images each month with each Application for Payment. Monthly Applications for Payment shall be deemed incomplete if not accompanied by the required Progress Photographs. Contractor's failure or election to not submit a monthly Application for Payment shall not affect the requirement for monthly Progress Photographs:

1) For Facility Contracts with a Total Bid Price over $100,000, at least once each month during construction: Provide five (5) progress photos as directed by Owner's Representative.

c. Completed Project Photographs:

1) For Facility Contracts submit two sets of Completed Project Photographs, after Date of Substantial Completion and prior to final payment.

4. Labeling:

a. Digital Images: Place a label on the CD. Labels shall contain the following information:

1) Name of Project and Project Number

2) Name of Contractor.

3) Name and address of commercial photographer who took the photograph, if applicable

4) For each digital image create a file name which has as part of the name the date the photograph was taken and the location of the photograph by station, coordinates or other unique identifier.

5) All images shall be uploaded to SharePoint with the same file names used on the CDs.

B. Quality Assurance:

1. Contractor shall be responsible for the quality of and timely execution and submittal of photographs.
2. Contractor shall schedule and coordinate photographer with Owner's Representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanics and administration of the submittal process for:
    a. Shop Drawings.
    b. Samples.
    c. Miscellaneous submittals.
    d. Operation and Maintenance Manuals.
2. General content requirements for Shop Drawings.
3. Content requirements for Operation and Maintenance Manuals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Sections in Divisions 02 through 48 identifying required submittals.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 DEFINITIONS

A. Shop Drawings:

1. See General Conditions.
2. Product data and samples are Shop Drawing information.

B. Operation and Maintenance (O&M) Manuals:

1. Contain the information required for proper installation and maintenance of building materials and finishes.
2. Contain the technical information required for proper installation, operation and maintenance of process, electrical and mechanical equipment and systems.

C. Miscellaneous Submittals:

1. Submittals other than Shop Drawings and O&M Manuals.

2. Representative types of miscellaneous submittal items include but are not limited to:
    a. Construction schedule.
    b. Facility Shutdown Plan(s)
    c. HVAC test and balance reports.
    d. Manufacturer's installation certification letters.
    e. Instrumentation and control commissioning reports.
    f. Warranties.
    g. Service agreements.
    h. Construction photographs.
    i. Record Documents.
    j. Cost breakdown (Schedule of Values).
    k. Safety Plan(s).

1.5 SUBMITTAL SCHEDULE

A. Schedule of Shop Drawings:
    1. Submitted and approved within 20 days of receipt of Notice to Proceed.
    2. Account for multiple transmittals under any specification section where partial submittals will be transmitted.

B. Shop Drawings: Submittal and approval prior to 50 percent completion.

C. Operation and Maintenance Manuals and Completed Equipment Record Sheets: Initial submittal within 60 days after date Shop Drawings are approved.

1.6 PREPARATION OF SUBMITTALS

A. General:
    1. All submittals and all pages of all copies of a submittal shall be completely legible.
    2. Submittals which, in the Owner's Representative's or Principal Architect/Engineer's sole opinion, are illegible will be returned without review.

B. Shop Drawings:
    1. Scope of any submittal and shop drawing transmittal:
        a. Submit shop drawings utilizing Owner's standard Submittal Transmittal Form.
        b. Limited to one (1) Specification Section.

c. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a “Basic Requirements” Section.

2. Numbering letter of transmittal:
   a. Include a series number, "xx", beginning with "01" and increasing sequentially with each additional transmittal.
   b. Assign consecutive series numbers to subsequent transmittals.
3. Describing transmittal contents:
   a. Provide listing of each component or item in submittal capable of receiving an independent review action.
   b. Identify for each item:
      1) Manufacturer and Manufacturer's Drawing or data number.
      2) Contract Document tag number(s).
      3) Unique page numbers for each page of each separate item.
      4) Use divider sheets with labeled tabs to separate independent items within a single submittal.
   c. When submitting "or-equal" items that are not the products of named manufacturers, include the words "or-equal" in the item description.
4. Contractor stamping:
   a. General:
      1) Contractor's review and approval stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
         a) Contractor's signature and date shall be wet ink signature. Is an electronic signature acceptable as most submittals are uploaded to SharePoint as a .PDF electronic document?
         b) Shop Drawing submittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated under General Conditions Paragraph 6.20.4."
      2) Submittals containing multiple independent items shall be prepared with an index sheet for each item listing the discrete page numbers for each page of that item, which shall be stamped with the Contractor's review and approval stamp.
         a) Individual pages or sheets of independent items shall be numbered in a manner that permits Contractor's review and approval stamp to be associated with the entire contents of a particular item.

b) Use divider sheets with labeled tabs to separate independent items within a single submittal.

b. Electronic stamps:

1) Contractor may electronically embed Contractor's review and approval stamp to either the Submittal Transmittal Form or a separate index sheet preceding each independent item in the submittal.

2) Contractor's signature and date on electronically applied stamps shall be wet ink signature. Is an electronic signature acceptable as most submittals are uploaded to SharePoint as a PDF electronic document?

5. Resubmittals:

a. Number with original root number and a suffix letter starting with "A" on a new Submittal Transmittal Form.

b. Do not increase the scope of any prior transmittal.

c. Account for all components of prior transmittal.

1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate (See also 1.6, this Section).

a) Do not include submittal information for items listed with prior "A" or "B" in resubmittal.

2) Indicate items to be resubmitted “at a later date” for any prior "C" or "D" Action item not included in resubmittal.

a) Obtain Principal Architect/Engineer’s approval to exclude items.

6. Electronic submittals utilizing web based document management system (SharePoint®):

a. Shop drawing submittals shall be produced (scanned) in Adobe Acrobat's Portable Document Format (PDF) Version 5.0 or higher.

b. Do not password protect and/or lock the PDF document.

c. Create one (1) PDF document (PDF file) for each submittal.

d. Drawings or other graphics must be converted to PDF format and made part of the singe (one [1]) PDF document.

1) Scanning to be used only where actual file conversion is not possible.

e. Limit PDF document size to 5MB.

f. Rotate pages that must be viewed in landscape to the appropriate position for easy reading.

g. Images only shall be scanned at a resolution of 300 dpi or greater.

1) Perform Optical Character Recognition (OCR) capture on all images.

2) Achieve OCR with the "original image with hidden text" option.

3) Word searches of the PDF document must operate successfully to demonstrate OCR compliance.

h. Create bookmarks in the navigation frame, for each entry in the Table of Contents/Index.

1) Normally three (3) levels deep (i.e., "Chapter," "Section," "Sub-section").

i. Thumbnails must be generated for each PDF file.

j. Set the opening view for PDF files as follows:

1) Initial view: Bookmarks and Page.

2) Magnification: Fit in Window.

3) Page layout: Single page.

4) Set the file to open to the cover page of the submittal with bookmarks to the left, and the first bookmark linked to the cover page.

k. All PDF documents shall be set with the option "Fast Web View" to open the first pages of the document for the viewer while the rest of the document continues to load.

l. File naming conventions:

1) File names shall use a "nine dot three" convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the Shop Drawing Root series number and Z is an ID number used to designate the associated volume.

a) Example 1:

(1) Two (2) pumps submitted as separate Shop Drawings under the same Specification Section:

(a) Pump 1 = 43 21 21-01-1.pdf.

(b) Pump 2 = 43 21 21-02-1.pdf.

b) Example 2:

(1) Control system submitted as one (1) Shop Drawing but separated into two (2) shop drawing submittals:

(a) Volume 1 = 40 90 00-01-1.pdf.

(b) Volume 2 = 40 90 00-01-2.pdf.

7. Provide clear space (3 In Sq) for Principal Architect/Engineer stamping of each component defined in the PREPARATION OF SUBMITTALS Article – Contractor Stamping.

8. Contractor shall not use red color for marks on transmittals.

a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.

b. Outline Contractor marks on reproducible transparencies with a rectangular box.

9. Transmittal contents:

   a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Owner's Representative and the Principal Architect/Engineer.

   b. Identify equipment or material use, tag number, Drawing detail reference, weight, and other Project specific information.

   c. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.

   d. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets on 8-1/2 x 11 In pages.

      1) Clearly mark (indicate) exact item or model and all options proposed.

   e. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data in addition to information specifically stipulated in the Specification Section.

      1) Arrange data and performance information in format similar to that provided in Contract Documents.

      2) Provide, at minimum, the detail specified in the Contract Documents.

   f. Provide warranty information.

   g. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet.

10. Samples:

   a. Identification:

      1) Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, standard Specification Section or Drawing detail reference, color, range, texture, finish and other pertinent data.

      2) If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.

   b. Include application specific brochures, and installation instructions.

c. Provide Contractor's stamp of approval on samples or transmittal form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.

d. Resubmit samples of rejected items.

C. Miscellaneous Submittals:

1. Prepare in the format and detail specified in Specification requiring the miscellaneous submittal.

D. Operation and Maintenance Manuals:

1. Owner's use of manufacturer's Operation and Maintenance materials:

a. Materials are provided for Owner's use, reproduction and distribution as training and reference materials within Owner's organization.

1) Applicable to hard copy or electronic media.

2) Applicable to materials containing copyright notice as well as those with no copyright notice.

b. Notify manufacturer of this intended use of materials provided under the Contract.

2. Number each Operation and Maintenance Manual transmittal with the original root number of the associated Shop Drawing.

a. Identify resubmittals with the original number plus a suffix letter starting with "A."

3. Submittal format:

a. Interim submittals: Submit two (2) paper copies until manual is approved.

b. Final submittals:

1) Within 30 days of receipt of approval, submit one (1) additional paper copy and two (2) electronic copies to the Owner’s Document Management System (SharePoint) in Portable Document Format (PDF).

a) Compact discs to be secured in jewel cases.

2) Electronic copies will be reviewed for conformance with the approved paper copy and the electronic copy (PDF) requirements of this Specification.

3) Non-conforming CDs will be returned with comments.

a) Provide final CDs within 30 days of receipt of comments.

4. Paper copy submittals:

a. Submit Operation and Maintenance Manuals printed on 8-1/2 x 11 In size heavy first quality paper with standard three-hole punching and bound in

appropriately sized three-ring (or post) vinyl view binders with clear overlays front, spine and back.

1) Provide binders with titles inserted under clear overlay on front and on spine of each binder.
   a) As space allows, binder titles shall include, but not necessarily be limited to, Project Name, related Specification Number, Equipment Name(s) and Project Equipment Tag Numbers.
2) Provide a Cover Page for each manual with the following information:
   a) Manufacturer(s).
   b) Date.
   c) Project Owner and Project Name.
   d) Specification Section.
   e) Project Equipment Tag Numbers.
   f) Model Numbers.
   g) Principal Architect/Engineer.
   h) Contractor.
3) Provide a Table of Contents or Index for each manual.
4) Use plastic-coated dividers to tab each section of each manual per the manual's Table of Contents/Index for easy reference.
5) Provide plastic sheet lifters prior to first page and following last page.

b. Reduce Drawings or diagrams bound in manuals to an 8-1/2 x 11 In or 11 x 17 In size.
   1) Where reduction is not practical to ensure readability, fold larger Drawings separately and place in vinyl envelopes which are bound into the binder.
   2) Identify vinyl envelopes with Drawing numbers.

c. Mark each sheet to clearly identify specific products and component parts and data applicable to the installation for the Project.
   1) Delete or cross out information that does not specifically apply to the Project.

5. Electronic copy submittals:
   a. Electronic copies of the approved paper copy Operation and Maintenance Manuals are to be produced in Adobe Acrobat's Portable Document Format (PDF) Version 5.0 or higher.
   b. Do not password protect and/or lock the PDF document.

c. Create one (1) PDF document (PDF file) for each equipment O&M Manual.

d. Drawings or other graphics must be converted to PDF format and made part of the one (1) PDF document.

   1) Scanning to be used only where actual file conversion is not possible.

e. Rotate pages that must be viewed in landscape to the appropriate position for easy reading.

f. Images only shall be scanned at a resolution of 300 dpi or greater.

   1) Perform Optical Character Recognition (OCR) capture on all images.

   2) Achieve OCR with the "original image with hidden text" option.

   3) Word searches of the PDF document must operate successfully to demonstrate OCR compliance.

g. Create bookmarks in the navigation frame, for each entry in the Table of Contents/Index.

   1) Normally three (3) levels deep (i.e., "Chapter," "Section," "Sub-section").

h. Thumbnails must be generated for each PDF file.

i. Set the opening view for PDF files as follows:

   1) Initial view: Bookmarks and Page.

   2) Magnification: Fit in Window.

   3) Page layout: Single page.

   4) Set the file to open to the cover page of the manual with bookmarks to the left, and the first bookmark linked to the cover page.

j. All PDF documents shall be set with the option "Fast Web View" to open the first pages of the document for the viewer while the rest of the document continues to load.

k. File naming conventions:

   1) File names shall use a "ten dot three" convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the Shop Drawing Root number and Z is an ID number used to designate the associated volume.

      a) Example 1:

         (1) Two (2) pumps submitted as separate Shop Drawings under the same Specification Section:

            (a) Pump 1 = 43 21 21-01-1.pdf.

            (b) Pump 2 = 43 21 21-02-1.pdf.

b) Example 2:

(1) Control system submitted as one (1) Shop Drawing but separated into two (2) O&M volumes:

(a) Volume 1 = 40 90 00-01-1.pdf.

(b) Volume 2 = 40 90 00-01-2.pdf.

l. Labeling:

1) As a minimum, include the following labeling on all CD-ROM discs and jewel cases:

a) Project Name.

b) Equipment Name and Project Tag Number.

c) Project Specification Section.

d) Manufacturer Name.

e) Vendor Name.

m. Binding:

1) Include labeled CD(s) in labeled jewel case(s).

a) Bind jewel cases in standard three-ring binder Jewel Case Page(s), inserted at the front of the Final paper copy submittal.

b) Jewel Case Page(s) to have means for securing Jewel Case(s) to prevent loss (e.g., flap and strap).

6. Operation and Maintenance Manuals for Materials and Finishes:

a. Building Products, Applied Materials and Finishes:

1) Include product data, with catalog number, size, composition and color and texture designations.

2) Provide information for re-ordering custom manufactured products.

b. Instructions for Care and Maintenance:

1) Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and recommended schedule for cleaning and maintenance.

c. Moisture Protection and Weather Exposed Products:

1) Include product data listing, applicable reference standards, chemical composition, and details of installation.

2) Provide recommendations for inspections, maintenance and repair.

d. Additional requirements as specified in individual product specifications.

7. Operation and Maintenance Manuals for Equipment and Systems:

a. Submission of Operation and Maintenance Manuals for equipment and systems is applicable but not necessarily limited to:

   1) Major equipment.

   2) Equipment powered by electrical, pneumatic or hydraulic systems.

   3) Specialized equipment and systems including instrumentation and control systems and system components for HVAC process system control.

   4) Valves and water control gates.

b. Equipment and Systems Operation and Maintenance Manuals shall include, but not necessarily be limited to, the following completed forms and detailed information, as applicable:

   1) Fully completed type-written copies of the associated Equipment Record(s), Exhibits A1, A2 and A3, shall be included under the first tab following the Table of Contents of each Operation and Maintenance Manual.

      a) Each section of the Equipment Record must be completed in detail.

         (1) Simply referencing the related manual for nameplate, maintenance, spare parts or lubricant information is not acceptable.

      b) For equipment items involving components or subunits, a fully completed Equipment Record Form is required for each operating component or subunit.

      c) Submittals that do not include the associated Equipment Record(s) will be rejected without further content review.

      d) Electronic copies of the Exhibits may be obtained by contacting the Project Manager.

   2) Equipment function, normal operating characteristics, limiting operations.

   3) Assembly, disassembly, installation, alignment, adjustment, and checking instructions.

   4) Operating instructions for start-up, normal operation, control, shutdown, and emergency conditions.

   5) Lubrication and maintenance instructions.

   6) Troubleshooting guide.

   7) Parts lists:

      a) Comprehensive parts and parts price lists.

      b) A list of recommended spare parts.

c) List of spare parts provided as specified in the associated Specification Section.

8) Outline, cross-section, and assembly Drawings; engineering data; and electrical diagrams, including elementary diagrams, wiring diagrams, connection diagrams, word description of wiring diagrams and interconnection diagrams.

9) Test data and performance curves.

10) As-constructed fabrication or layout Drawings and wiring diagrams.

11) Instrumentation or tag numbers assigned to the equipment by the Contract Documents are to be used to identify equipment and system components.

12) Additional information as specified in the associated equipment or system Specification Section.

1.7 TRANSMITTAL OF SUBMITTALS

A. Shop Drawings, Samples and Operation and Maintenance Manuals:

1. Transmit all submittals via Owner's Document Management System (SharePoint).
2. Transmit all paper submittals to the address provided below.

   San Jacinto River Authority

   1577 Dam Site Road

   Conroe, TX 77304

   Attn: Stephanie Zertuche

3. Utilize SJRA Standard Submittal Transmittal Form (to be provided by Owner) to transmit all Shop Drawings, Samples and Operation and Maintenance Manuals.
4. All submittals must be from Contractor.
   a. Submittals will not be received from or returned to subcontractors.
   b. Operation and Maintenance Manual submittal stamp may be Contractor's standard approval stamp.
5. Provide submittal information defining specific equipment or materials utilized on the Project.
   a. Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.

B. Miscellaneous Submittals:

1. Transmit under Contractor's standard Submittal Transmittal Form or letterhead.
2. Submit in triplicate or as specified in individual Specification Section.
3. Transmit to the address provided below.

   San Jacinto River Authority

   1577 Dam Site Road

   Conroe, TX 77304

   Attn: Stephanie Zertuche

4. Provide copy of Submittal Transmittal without attachments to Owner's Representative.

C. Expedited Return Delivery:
   1. Include prepaid express envelope or airbill in submittal transmittal package for any submittals Contractor expects or requires express return mail.
   2. Inclusion of prepaid express envelope or airbill does not obligate Owner’s Representative or Principal Architect/Engineer to conduct expedited review of submittal.

D. Fax Transmittals:
   1. Permitted on a case-by-case basis to expedite review when approved by Principal Architect/Engineer.
   2. Requires hard copy transmittal to immediately follow.
      a. Principal Architect/Engineer will proceed with review of fax transmittal.
      b. Principal Architect/Engineer 's approval or rejection comments will be recorded and returned on hard copy transmittal.
   3. Provisions apply to both:
      a. Initial transmittal contents.
      b. Supplemental information required to make initial transmittal contents complete.

1.8 PRINCIPAL ARCHITECT/ENGINEER 'S REVIEW ACTION

A. Shop Drawings and Samples:
   1. Items within transmittals will be reviewed for overall design intent and will receive one of the following actions:
      a. NO EXCEPTION.
      b. EXCEPTIONS AS NOTED.

c. REVISE & RESUBMIT

d. REJECTED - RESUBMIT.

e. ACKNOWLEDGE RECEIPT.

f. FOR INFORMATION PURPOSES ONLY.

g. SUPPLEMENTARY INFORMATION.

2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp.

   a. Submittals not stamped by the Contractor or stamped with a stamp containing language other than that specified herein will not be reviewed for technical content and will be returned without any action.

3. In relying on the representation on the Contractor's review and approval stamp, Owner and Principal Architect/Engineer reserve the right to review and process poorly organized and poorly described submittals as follows:

   a. Submittals transmitted with a description identifying a single item and found to contain multiple independent items:

      1) Review and approval will be limited to the single item described on the transmittal letter.

      2) Other items identified in the submittal will:

         a) Not be logged as received by the Principal Architect/Engineer.

         b) Be removed from the submittal package and returned without review and comment to the Contractor for coordination, description and stamping.

         c) Be submitted by the Contractor as a new series number, not as a re-submittal number.

   b. Principal Architect/Engineer, at Principal Architect/Engineer's discretion, may revise the transmittal letter item list and descriptions, and conduct review.

      1) Unless Contractor notifies Principal Architect/Engineer in writing that the Principal Architect/Engineer's revision of the Submittal Transmittal Form item list and descriptions was in error, Contractor's review and approval stamp will be deemed to have applied to the entire contents of the submittal package.

4. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation.

   a. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.

b. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.

5. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:

   a. The portion of the submittal given "C" or "D" will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference).

      1) One (1) copy or the one (1) transparency of the "C" or "D" Drawings will be marked up and returned to the Contractor.

         a) Correct and resubmit items so marked.

   b. Items marked "A" or "B" will be fully distributed.

   c. If a portion of the items or system proposed are acceptable, however, the major part of the individual Drawings or documents are incomplete or require revision, the entire submittal may be given "C" or "D" Action.

      1) This is at the sole discretion of the Principal Architect/Engineer.

      2) In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."

      3) Distribution to the Owner and field will not be made (unless previously agreed to otherwise).

6. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Contractor with "C" or "D" Action.

7. Calculations: Requirements for the submittal of calculations in the individual Specification Sections shall be satisfied through the submittal of a certification sealed by the Principal Architect/Engineer that the calculations have been performed. Certification will be received for information purposes only and will be returned stamped "D. ACKNOWLEDGE RECEIPT ".

8. Transmittals of submittals which the Principal Architect/Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" Action in a prior submittal, will be returned with Action "E. Acknowledge Receipt" (Principal Architect/Engineer 's Review Not Required).

9. Samples may be retained for comparison purposes.

   a. Remove samples when directed.

   b. Include in bid all costs of furnishing and removing samples.

10. Approved samples submitted or constructed, constitute criteria for judging completed work.
    a. Finished work or items not equal to samples will be rejected.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

EXHIBIT A1

Equipment Record

Equipment Data and Spare Parts Summary

Project Name	Specification Section:
Equipment Name	Year Installed:
Project Equipment Tag No(s).	

Equipment Manufacturer		Project/ Order No.
Address		Phone
Fax	Web Site	E-mail
Local Vendor/Service Center		
Address		Phone
Fax	Web Site	E-mail

MECHANICAL NAMEPLATE DATA

Equip.		Serial No.		
Make		Model No.		
ID No.	Frame No.	HP	RPM	Cap.
Size	TDH	Imp. Sz.	CFM	PSI
Other:				

ELECTRICAL NAMEPLATE DATA

Equip.				Serial No.				
Make				Model No.				
ID No.	Frame No.	HP	V.	Amp.	HZ	PH	RPM	SF
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating	
Other:								

SPARE PARTS PROVIDED PER CONTRACT

Part No.	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

EXHIBIT A2

Equipment Record

Recommended Maintenance Summary

Equipment Description	Project Equip. Tag No(s).

RECOMMENDED BREAK-IN MAINTENANCE (FIRST OIL CHANGES, ETC.)	INITIAL COMPLETION * FOLLOWING START-UP						
	D	W	M	Q	S	A	Hours

RECOMMENDED PREVENTIVE MAINTENANCE	PM TASK INTERVAL *						
	D	W	M	Q	S	A	Hours

* D = Daily W = Weekly M = Monthly Q = Quarterly S = Semiannual A = Annual Hours

EXHIBIT A3

Equipment Record

Lubrication Summary

Equipment Description	Project Equip. Tag No(s).

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

END OF SECTION

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SECTION 01 45 16.32

CONTRACTOR'S QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Measurement and Payment
2. Quality Assurance/Control of Installation
3. References
4. Manufacturer's Field Services and Reports

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality at no additional cost to the Owner.

B. Comply fully with manufacturers' installation instructions, including each step in sequence.

C. Request clarification Owner's Representative before proceeding when manufacturers' instructions conflict with Contract.

D. Comply with specified standards as minimum requirements for Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce specified level of workmanship.

1.5 REFERENCES

A. Obtain copies of standards and maintain at job site when required by individual Specification sections.

1.6 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual Specification sections or as required by Owner's Representative, provide material or product suppliers' or manufacturers' technical representative to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, operator training, test, adjust and balance of equipment as applicable and to initiate operation, as required. Conform to minimum time requirements for start-up operations and operator training when defined in Specification sections.

B. At Owner's Representative's request, submit qualifications of manufacturers' representative to Owner's Representative 15 days in advance of required representatives' services. Representative is subject to approval by Owner's Representative.

C. A manufacturers' representative is to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to a manufacturer's written instructions. Submit report within 14 days of observation to Owner's Representative for review.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 65 50

PRODUCT DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for product delivery, storage and handling.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this payment.

1.3 SUBMITTALS

A. Provide Owner project Log Book.

1.4 TRANSPORTATION

A. Make arrangements for transportation, delivery, and handling of equipment and materials required for timely completion of Work.

B. Transport and handle products in accordance with instructions.

C. Consign and address shipping documents to proper party giving name of Project, street number, and city. Shipments shall be delivered to Contractor.

1.5 DELIVERY

A. Scheduling: Schedule delivery of products or equipment as required to allow timely inspection and installation, and to avoid prolonged storage, overburdening of limited storage space, conflicts with other contractors on site. Confirm availability of equipment and personnel for handling products prior to delivery.

B. Packaging: Deliver products or equipment in manufacturer's original unopened and unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.

C. Identification: Clearly and fully mark and identify as to manufacturer, item, and installation location.

D. Protection and Handling: Provide manufacturer's instructions for storage and handling.

PART 2 - PRODUCTS

A. Products: Means material, equipment, or systems forming Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of Work. Products may also include existing materials or components designated for reuse.

B. For material and equipment specifically indicated or specified to be reused in the work:

   1. Use special care in removal, handling, storage and reinstallation, to assure proper function in completed work.

   2. Arrange for transportation, storage and handling of products which require offsite storage, restoration or renovation. Pay all costs for such work.

C. When contract documents require that installation of work comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in installation, including two copies to Owner's Representative. Maintain one set of complete instructions at job site during installation until completion.

D. Provide equipment and components from fewest number of manufacturers as practical, in order to simplify spare parts inventory and allow for maximum interchangeability of components. For multiple components of same size, type, or application, use same make and model of component throughout Project.

PART 3 - EXECUTION

3.1 PROTECTION, STORAGE AND HANDLING

A. Protection:

   1. Protect materials in accordance with manufacturer's recommendations and requirements of these Specifications.

      a. Store products or equipment in location to avoid loss or physical damage to items while in storage.

   2. Protect equipment from exposure to elements and keep thoroughly dry.

   3. When space heaters are provided in equipment, connect and operate heaters during storage until equipment is placed in service.

B. Storage:

   1. Store materials in accordance with manufacturer's recommendations and requirements of these Specifications.

   2. Make necessary provisions for safe storage of materials and equipment. Place loose soil materials, and materials to be incorporated into Work to prevent damage to any part of Work or existing facilities and to maintain free access at all times to all parts of Work and to utility service company installations in vicinity of Work. Keep materials and equipment neatly and compactly stored in locations that will cause minimum inconvenience to

other contractors, public travel, adjoining owners, tenants, and occupants. Arrange storage to provide easy access for inspection.

3. Restrict storage to areas available on construction site for storage of material and equipment as shown on Drawings or approved by Owner's Representative.
4. Provide off-site storage and protection when on-site storage is not adequate. Provide addresses of and access to off-site storage locations for inspection by Owner's Representative.
5. Do not use lawns, grass plots, or other private property for storage purposes without written permission of owner or other person in possession or control of premises.
6. Store in manufacturers' unopened containers.
7. Neatly, safely, and compactly stack materials delivered and stored along line of Work to avoid inconvenience and damage to property owners and general public, and maintain at least 3 feet from fire hydrant. Keep public, private driveways, and street crossings open.
8. Repair or replace damaged lawns, sidewalks, streets, or other improvements to satisfaction of Owner's Representative. Total length which materials may be distributed along route of construction at one time is 1,000 linear feet, unless otherwise approved in writing by Owner's Representative.

C. Handling:

1. Handle materials in accordance with manufacturer's recommendations and requirements of these Specifications.
2. Coordinate off-loading of materials and equipment delivered to job site. If necessary to move stored materials and equipment during construction, relocate materials and equipment at no additional cost to Owner. Do not allow the off-loading of materials in those parking areas used for crew's personal vehicles.
3. Provide equipment and personnel necessary to handle products by methods to prevent damage to products or packaging.
4. Provide additional protection during handling as necessary to prevent breaking, scraping, marring, or otherwise damaging products or surrounding areas.
5. Handle products by methods to prevent over bending or over stressing.
6. Lift heavy components only at designated lifting points.
7. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

3.2 STORAGE FACILITIES (NOT USED)

3.3 FIELD QUALITY CONTROL

A. Inspect Deliveries:

1. Inspect all products or equipment delivered to the site prior to unloading.

   a. Reject all products or equipment that are damaged, used, or in any other way unsatisfactory for use on Project.

END OF SECTION

SECTION 01 71 13

MOBILIZATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for mobilization.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Measurement for mobilization is on lump sum basis.

B. Mobilization payments will be included in periodic progress payment upon written application subject to following provisions:

1. Authorization for payment of 50 percent of Contract Price for mobilization will be made upon receipt and approval by Owner's Representative of the following items, as applicable:
   a. Schedule of Values submittal in accordance with Specification Section 01 29 73 – Schedule of Values.
   b. Construction Schedule submittal in accordance with Specification Section 01 32 16 – Construction Progress Schedule.
   c. Preconstruction photographs in accordance with Specification Section 01 32 36.01 – Project Photographs.
2. Authorization for payment of remaining 50 percent of Contract Price for mobilization will be made upon completion of Work amounting to 5 percent of Contract Price less mobilization unit price.

C. Mobilization payments will be subject to retainage amounts stipulated in Specification Section 00 72 00 – General Conditions of the Contract.

1.3 SUBMITTALS (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 73 20

OPENINGS AND PENETRATIONS IN CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for installing and sealing openings and penetrations in construction.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 07 62 00 – Flashing and Sheet Metal.

1.2 MEASUREMENT AND PAYMENT (NOT USED)

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. National Fire Protection Association (NFPA):
   a. 70 – National Electrical Code (NEC).
   b. 90A – Standard for Installation of Air Conditioning and Ventilating Systems.
2. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

B. Obtain prior approval from Principal Architect/Engineer when any opening larger than 100 SQ IN must be made in existing or newly completed construction.

1.4 DEFINITIONS

A. Hazardous Areas: Areas shown in the Contract Documents as having Class I or Class II area classifications.

B. Washdown Areas: Areas having floor drains or hose bibs.

1.5 SUBMITTALS (NOT USED)

1.6 PROJECT CONDITIONS (NOT USED)

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS (NOT USED)

2.2 MATERIALS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION AND APPLICATION

A. Perform HVAC penetrations in accordance with NFPA 90A.

B. Perform electrical penetrations in accordance with NFPA 70, Article 501.

C. Where pipes, conduits or ducts pass through floors in washdown areas, install sleeves with top 3 IN above finish floors.

1. In non-washdown areas, install sleeves with ends flush with finished surfaces.

D. Size sleeves, blockouts and cutouts which will receive sealant seal such that free area to receive sealant is minimized and seal integrity may be obtained.

E. Do not cut into or core drill any beams, joists, or columns.

F. Do not install sleeves in beams, joists, or columns.

G. Do not install recesses in beams, joists, columns, or slabs.

H. Where alterations are necessary or where new and old work join, restore adjacent surfaces to their condition existing prior to start of work.

I. For interior wall applications where backer rod and sealant are specified, provide backer rod and sealant at each side of wall.

3.2 SCHEDULES

A. General Schedule of Penetrations through Floors, Roofs, Foundation Base Slabs, Foundation Walls, Foundation Footings, Partitions and Walls for Ductwork, Piping, and Conduit:

1. Provide the following opening and penetration types:

a. Type C - Fabricated sheet metal sleeve or pipe sleeve cast-in-place. Provide pipe sleeve with water ring for wet and/or washdown areas.

b. Type D - Commercial type casting or fabrication.

c. Type F - Integrally cast pipe, duct or conduit.

d. Type G - Saw cut or line-drill and remove area 1 IN larger than outside dimensions of duct, pipe or conduit.

2. Provide seals of material and method described as follows.

a. Category 2 - Roof curb and flashing according to SMACNA specifications unless otherwise noted on Drawings. Refer to Specification Section 07 62 00 and roofing Specification Sections for additional requirements.

b. Category 4 - Backer rod and sealant.

3. Furnish openings and sealing materials through new floors, roofs, partitions and walls in accordance with Schedule A, Openings and Penetrations for New Construction.
4. Furnish openings and sealing materials through existing floors, roofs, partitions and walls in accordance with Schedule B, Openings and Penetrations for Existing Construction.

SCHEDULE A. OPENINGS AND PENETRATIONS SCHEDULE FOR NEW CONSTRUCTION

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	C F I	7 Not Req 7	D F I (1)	Not Req Not Req 7	C F	7 Not Req
Through floors on grade above water table	C F I	4 Not Req 4	C F I (1)	7 Not Req 7	C F I (1)	4 Not Req 7
Through slab on grade below water table	F	Not Req	F	Not Req	F	Not Req
Through floors in washdown areas	C I	4 4	C H (2) I (1)	4 3 4	F H (2) I (1)	Not Req 3 7
Through walls where one side is a hazardous area	C F I	7 Not Req 7	D F I (1)	Not Req Not Req 7	C F	7 Not Req
Through exterior wall below grade above water table	C F I	7 Not Req 7	C D F I (1)	1 Not Req Not Req 1	F I (1)	Not Req 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	C F I	7 Not Req 7	C D F H (2)	1 Not Req Not Req 1	C F H (2) I (1)	7 Not Req 7 7
Through wall from tankage or wet well (below high water level) to dry well or dry area	F	Not Req	F	Not Req	F	Not Req

Through exterior wall above grade	A B C	6 6 6	A B D H (2)	5 5 Not Req 5	C H (2)	5 4
Roof penetrations	A	2	A	2	A	2
Through interior walls and slabs not covered by the above applications	A C	4 4	A C	4 4	A C F	4 4 Not Req

SCHEDULE B. OPENINGS AND PENETRATIONS SCHEDULE FOR EXISTING CONSTRUCTION

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	B E	7 Not Req	B (1) E (3) H (2)	7 Not Req 7	B (1) E (3) H (2)	7 Not Req 7
Through floors on grade above water table	B	7	B	7	B	7
Through slab on grade below water table	E	Not Req	E	Not Req	E	Not Req
Through floors in washdown areas	G	3	G H (2)	3 3	G H (2)	3 3
Through walls where one side is a hazardous area	B E	7 Not Req	B (1) B (3) E H (2)	7 1 Not Req 7	B (1) (3) E H (2)	7 Not Req 7
Through exterior wall below grade above water table	B	7	B (1) B (3) H (2)	7 1 7	B (1) (3) H (2)	7 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	B E	7 Not Req	B E H (2)	1 Not Req 1	B (1) (3) E H (2)	7 Not Req 7
Through wall from tankage or wet well (below high water level) to dry well or dry	E	Not Req	E	Not Req	E	Not Req

area						
Through exterior wall above grade	G	6	G (1) (3) H (2)	5 5	G (1) (3) H (2)	5 7
Roof penetrations	G	2	G (1) (3) H (2)	2	G	2
Through interior walls and slabs not covered by the above applications	G	4	G (1) (3) H (2)	4 4	G (1) (3) H (2)	4 4

(1) Multiple piping 3 IN and smaller or multiple conduits.

(2) Single pipe 3 IN and smaller or single conduit.

(3) Single pipe or conduit larger than 3 IN.

END OF SECTION

SECTION 01 73 29

DEMOLITION, CUTTING, AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes demolition, cutting and patching of existing construction where shown on Drawings, or as required to accommodate new work shown or specified.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 SUBMITTALS (NOT USED)

1.4 DELIVERY, STORAGE, AND HANDLING

A. General:

1. Salvage each item with auxiliary or associated equipment required for operation.

1.5 PROJECT CONDITIONS

A. Perform preliminary investigations as required to ascertain extent of work.

1.6 SEQUENCING AND SCHEDULING (NOT USED)

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS (NOT USED)

2.2 MATERIALS

A. Temporary Partitions:

1. Plywood: 1/2 IN minimum for interior or exterior use.
2. Paneling: 1/4 IN minimum for interior use.Specifier: PART 3 - EXECUTION is used to state the requirements for the Work to be accomplished in the field, e.g., installing, erecting, or applying products specified in PART 2. Avoid specifying means and methods.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide temporary partitions as required in public areas.

1. Construct partitions of braced plywood in exterior areas.
2. Adequately braced paneling may be used in interior areas.

B. Provide covered passageways where necessary to ensure safe passage of persons in or near areas of work.

C. Provide substantial barricades and safety lights as required.

D. Provide temporary dustproof partitions where indicated or necessary.

1. Prevent infiltration of dust into occupied areas.

E. Provide temporary weather protection as necessary.

3.2 INSTALLATION

A. Cutting and Removal:

1. Remove existing work indicated to be removed, or as necessary for installation of new work.
2. Neatly cut and remove materials, and prepare all openings to receive new work.
3. Remove masonry or concrete in small sections.

B. Matching and Patching:

1. Walls, ceilings, floors or partitions:

a. Repair abutting walls, ceilings, floors or partitions disturbed by removal.

b. Match and patch existing construction disturbed during installation of new work.

2. Methods and materials:

a. Similar in appearance, and equal in quality to adjacent areas for areas or surfaces being repaired.

b. Subject to review of Principal Architect/Engineer.

C. Salvaged Items:

1. Thoroughly dry and clean all metal surfaces.

2. Dispose of items or materials not designated for Owner's salvage or reuse. Promptly remove from site.

3. Do not store or sell Contractor salvaged items or materials on site.

D. Clean Up: Transport debris and legally dispose of offsite.

END OF SECTION

SECTION 01 74 13

CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes intermediate and final cleaning of Work, not including special cleaning of closed systems specified elsewhere.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 SUBMITTALS (NOT USED)

1.4 STORAGE AND HANDLING

A. Store cleaning products and cleaning wastes in containers specifically designed for those materials.

1.5 SCHEDULING

A. Schedule cleaning operations so that dust and other contaminants disturbed by cleaning process will not fall on newly painted surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents:

1. Compatible with surface being cleaned.
2. New and uncontaminated.
3. For Manufactured Surfaces: Material recommended by manufacturer.

PART 3 - EXECUTION

3.1 CLEANING - GENERAL

A. Prevent accumulation of wastes that create hazardous conditions.

B. Conduct cleaning and disposal operations to comply with laws and safety orders of governing authorities.

C. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains or sewers.

D. Dispose of degradable debris at an approved solid waste disposal site.

E. Dispose of nondegradable debris at an approved solid waste disposal site or in an alternate manner approved by regulatory agencies.

F. Handle materials in a controlled manner with as few handlings as possible.

G. Do not drop or throw materials from heights greater than 4 FT or less than 4 FT if conditions warrant greater care.

H. On completion of work, leave area in a clean, natural looking condition.

1. Remove all signs of temporary construction and activities incidental to construction of required permanent Work.

I. Do not burn on-site.

3.2 INTERIOR CLEANING

A. Cleaning During Construction:

1. Keep work areas clean so as not to hinder health, safety or convenience of personnel in existing facility operations.
2. At maximum weekly intervals, dispose of waste materials, debris, and rubbish.
3. Vacuum clean interior areas when ready to receive finish painting.
   a. Continue vacuum cleaning on an as-needed basis, until Substantial Completion.

B. Final Cleaning:

1. Complete immediately prior to Demonstration Period.
2. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed surfaces.
3. Wipe all lighting fixture reflectors, lenses, lamps and trims clean.
4. Wash and shine glazing and mirrors.
5. Polish glossy surfaces to a clear shine.
6. Ventilating systems:
   a. Clean permanent filters and replace disposable filters if units were operated during construction.

b. Clean ducts, blowers and coils if units were operated without filters during construction.

7. Replace all burned out lamps.
8. Broom clean process area floors.
9. Mop office and control room floors.

3.3 EXTERIOR (SITE) CLEANING

A. Cleaning During Construction:

1. Construction debris:

a. Confine in strategically located container(s):

1) Cover to prevent blowing by wind.

2) Store debris away from construction or operational activities.

3) Haul from site minimum once a week.

b. Remove from work area to container daily.

c. Site clean-up prior to storm events. Thoroughly clean site of all loose or unsecured items which may become airborne or transported by flowing water during storm events.

B. Final Cleaning:

1. Remove trash and debris containers from site.

a. Repair areas disturbed by location of trash and debris containers to Owner's satisfaction including but not limited to re-seeding, sod placement, pavement repair, asphalt repair, sidewalk repair, and rut removal and/or fill placement.

2. Clean paved roadways.

3.4 FIELD QUALITY CONTROL

A. Immediately prior to Demonstration Period, conduct an inspection with Owner's Representative to verify condition of all work areas.

END OF SECTION

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SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for construction waste management and disposal.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.

2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 SUBMITTALS

A. Conform to requirements of Specification Section 01 33 00 – Submittals.

B. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances. Submit a copy of all disposal permits to the Owner's Representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SALVAGEABLE MATERIAL

A. Other Salvageable Materials: Conform to requirements of individual Specification Sections.

B. Coordinate with the Owner's Representative the loading of salvageable material.

3.2 EXCESS MATERIAL

A. Remove and legally dispose of vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage from job site.

B. Remove waste materials from site daily, in order to maintain site in neat and orderly condition, unless otherwise authorized by the Owner.

END OF SECTION

SECTION 01 77 19

CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for closeout of a construction project.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 SUBSTANTIAL COMPLETION

A. Comply with Specification Section 00 72 00 – General Conditions of the Contract regarding Substantial Completion when Contractor considers the Work, or portion thereof designated by Owner's Representative, to be substantially complete.

B. Insure the following items have been completed when included in the Work, prior to presenting a list of items to be inspected by Owner's Representative for issuance of a Certificate of Substantial Completion:

1. Installation of all bid items included in Specification Section 00 41 00.02 – Proposal Form and approved Contract Document changes.
2. Any additional requirements in Specification Section 01 11 20 – Use of Premises.

C. Assist Owner's Representative with inspection of Contractor's list of items and complete or correct the items, including items added by Owner's Representative, within a time period of 30 days or as mutually agreed.

D. Should Owner's Representative's inspection show failure of Contractor to comply with substantial completion requirements, including those items in Paragraph 1.2B of this specification, Contractor shall complete or correct the items, before requesting another inspection by Owner's Representative.

1.5 CLOSEOUT PROCEDURES

A. Comply with Specification Section 00 72 00 – General Conditions of the Contract regarding Final Inspection and Final Payment when Work is complete and ready for Owner's Representative's final inspection.

B. Complete or correct items on punch list, with no new items added.

C. Owner will occupy portions of Work as specified in other Sections.

1.6 FINAL CLEANING

A. Execute final cleaning prior to Final Inspection.

B. For facilities, clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to sanitary condition.

D. Clean or replace filters of operating equipment.

E. Clean debris from roofs, gutters, down spouts, and drainage systems.

F. Clean site; sweep paved areas, rake landscaped surfaces clean.

G. Remove waste and surplus materials, rubbish, and temporary construction facilities from site following final test of utilities and completion of Work.

1.7 ADJUSTING (NOT USED)

1.8 OPERATION AND MAINTENANCE DATA

A. Submit operations and maintenance data as noted in Specification Section 01 33 00 – Submittals.

1.9 WARRANTY

A. Provide one original and two copies of each warranty from subcontractors, suppliers, and manufacturers.

B. Provide Table of Contents and assemble warranties in three-ring/D binder with durable plastic cover.

C. Submit warranties prior to final progress payment.

D. Warranties shall commence in accordance with requirements in Specification Section 00 72 00 – General Conditions of the Contract.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual Specification sections.

B. Deliver to location as directed by Owner's Representative; obtain receipt prior to final Payment Application.

1.11 TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR) INSPECTION

A. Contact TDLR's Houston Regional Office, 5425 Polk Street, Houston, Texas, 77023, telephone 713-924-6303, fax 713-921-3106, to schedule an inspection for ADA compliance prior to final completion.

B. Provide results of TDLR's inspection to Owner's Representative prior to final inspection.

1.12 FINAL PHOTOS

A. Provide per Specification Section 01 32 36.01 – Project Photographs.

1.13 PROJECT RECORD DOCUMENTS (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 04 01 20

MASONRY CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Masonry cleaning.
2. Specification Section is applicable to all exterior brick.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Use experienced workmen familiar with product and its application.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
   a. Manufacturer's application instructions.
   b. Manufacturer's dilution recommendations.
   c. Manufacturer's recommendations on neutralizing rinse.

B. Certifications:

1. Certification that Contractor is experienced in this type of masonry cleaning.
2. Certificate from cleaning solution manufacturer stating that product being used is compatible with and is intended for use on prefaced masonry units.
   a. Outline necessary precautions to be taken during cleaning operation.

1.5 WARRANTY (NOT USED)

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Cleaning solution: Detergent type.
    a. Pro So Co.
    b. Diedrich Technologies, Inc.
2. Cleaning solution for manganese or vanadium stained masonry:
    a. Pro So Co.
    b. Diedrich Technologies, Inc.

B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MATERIALS

A. Detergent-Type Cleaning Solution: Pro So Co. "Sure Clean #600" detergent masonry cleaner.

B. Manganese or Vanadium-Stained Masonry: Pro So Co. "Vanatrol."

C. Water: Potable.

D. Neutralizing rinse as required by manufacturer.

2.3 MIXES

A. Dilute cleaning solution with potable water at rate which will provide for the weakest solution allowable for cleaning wall.

B. If project conditions require solution of greater than 5 percent acid, obtain permission from Owner's Representative in writing prior to applying solution to wall surface.

PART 3 - EXECUTION

3.1 PREPARATION

A. Allow seven (7) days after completion of masonry work before start of cleaning.

B. Remove excess mortar using wooden paddles and scrapers.

C. Protect adjacent surfaces not to be cleaned.

3.2 APPLICATION

A. Protect adjacent surfaces subject to potential damage by cleaning solution.

B. Apply masonry cleaner to exposed-to-view masonry surfaces.
   1. Do not use wire brushes.
   2. Use only tools free of rust.
   3. Apply solution using fibered wall-washing brush.

C. Thoroughly rinse and pre-soak walls.

D. Flush all loose mortar and dirt from surface.

E. Wet to prevent "run-off" streaking.

F. Scrape off mortar and reapply cleaning solution.

G. After scrubbing, clean thoroughly with pressurized water.

H. Apply neutralizing rinse as recommended by manufacturer.

I. Do not clean "Sound Absorbing Masonry Units" with liquid cleaning solution, use dry stiff bristle brush.

3.3 OWNER TRAINING (NOT USED)

END OF SECTION

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SECTION 04 05 13

CEMENT AND LIME MORTARS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cement and lime mortars and masonry grout.
2. Mortar for glass unit masonry.
3. Integral water repellent admixture.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 04 21 13 – Brick Masonry.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute/American Society of Civil Engineers/The Masonry Society (ACI/ASCE/TMS).
   a. ACI 530.1/ASCE 6/TMS 602 – Specifications for Masonry Structures.
2. ASTM International (ASTM):
   a. C143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
   b. C144 – Standard Specification for Aggregate for Masonry Mortar.
   c. C150 – Standard Specification for Portland Cement.
   d. C207 – Standard Specification for Hydrated Lime for Masonry Purposes.
   e. C270 – Standard Specification for Mortar for Unit Masonry.
   f. C404 – Standard Specification for Aggregates for Masonry Grout.
   g. C476 – Standard Specification for Grout for Masonry.
   h. C1019 – Standard Test Method for Sampling and Testing Grout.
   i. C1093 – Standard Practice for Accreditation of Testing Agencies for Unit Masonry.
   j. C1384 – Standard Specification for Admixtures for Masonry Mortars.

B. Qualifications:

1. Testing Laboratory shall be an independent agency qualified in accordance with ASTM C1093 for performing the testing indicated.
    a. Testing Laboratory shall have a minimum of 10 years experience in the testing of mortar and grout.
2. Technician conducting tests shall have minimum of five (5) years experience in the testing of mortar and grout.

C. Mock-Ups:

1. Provide mortar and pointing grout for mock-up panels specified in Specification Section 04 21 13 – Brick Masonry

1.4 DEFINITIONS

A. Coarse grout and fine grout are defined by the aggregate size used in accordance with ASTM C476.

B. Coarse aggregate and fine aggregate are defined in ASTM C404, Table 1.

1.5 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Proposed mortar mix design, including proposed preblended, prepackaged dry mortar mixes.
        1) Proposed mortar mix for fire rated construction.
        2) Proposed mortar mix design to include brand, type and manufacturer of all cementitious materials and source or producer of aggregate.
        3) Provide integral water repellent manufacturer's certified recommended dosage rate for mortar batched each day during masonry construction.
    c. Proposed masonry grout mix design.
    d. Strength test results for all mortar and masonry grout (both coarse and fine grout) placed during construction.
    e. Slump test results of all masonry grout placed during construction.

B. Samples:

1. Actual colored mortar samples for color selection by Owner’s representative.
    a. Color card and plastic simulations are not acceptable.

C. Miscellaneous Submittals:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Qualifications of testing lab and technician.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location.
   1. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo.
   1. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

1.7 WARRANTY (NOT USED)

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement:
   1. ASTM C150, Type I or II.
   2. No air entrainment.
   3. Natural color.
   4. Maximum percent of alkalis: 0.60 in accordance with ASTM C150, Table 1A.

B. Hydrated Lime:
   1. ASTM C207, Type S.
   2. Type SA not acceptable.
   3. Lime substitutes are not acceptable.

C. Mortar Aggregate: ASTM C144, free of gypsum.

D. Masonry Grout:
   1. ASTM C476.
   2. No admixtures allowed.

E. Grout Aggregate: ASTM C404.

F. Water: Potable.

G. Mortar Pigments:

1. Commercial colorants suitably compounded for use in mortar mixes.
2. Do not exceed manufacturer's recommended pigment-to-cement ratios.

H. Integral Water Repellent Admixture:

1. Liquid polymeric admixture: ASTM C1384.
2. Verify compatibility with liquid water repellent admixture being used in the fabrication of concrete masonry units.
3. Do not use integral water repellent admixture in mortar for brick.

2.2 MIXES

A. Type "S" mortar shall be used:

1. Wherever a fire-resistance classification or rating is shown for unit masonry construction provide mortar of type which has been tested and listed for construction indicated.
2. Comply with ASTM C270, Table 1, proportion specification.
3. Do not use masonry cement.
4. Mix materials minimum of three (3) minutes and maximum of five (5) minutes.
5. Adjust consistency to satisfaction of mason.
6. Do not use admixtures unless otherwise indicated.
7. Provide integral water repellent admixture in all mortar used for both interior and exterior masonry work.

B. Masonry Grout:

1. Comply with ASTM C476, Table 1, proportion specification.
2. Use no anti-freeze additives.
3. No fly ash additives will be accepted.
4. Mix 5 minutes minimum.
5. Slump: 8 to 11 IN.
6. Do not add integral water repellent admixture to masonry grout mix.
7. At Contractor's option, manufactured grout meeting the above minimum requirements may be used.

2.3 SOURCE QUALITY CONTROL

A. Perform preconstruction laboratory tests on proposed masonry grout mix prior to start of masonry work.

1. Perform tests far enough in advance so that any necessary retesting can be accomplished before masonry construction begins.

a. Test grout per ASTM C1019.

B. Source Limitations for Mortar Materials:

1. Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one (1) source or producer for each aggregate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions and ACI 530.1/ASCE 6/TMS 602.

B. Use coarse grout in spaces with least dimension over 2 IN.

C. Use fine grout for grouting door frames.

1. Grout all steel and FRP door frames in masonry and concrete wall construction unless specifically noted not to be grouted.
2. Do not grout aluminum door frames.
3. Do not grout door frames in stud wall construction.

D. Consolidate all grout while installing.

1. Consolidate grout pours 12 IN or less in height by mechanical vibration or by puddling.
2. Consolidate grout pours exceeding 12 IN in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

3.2 FIELD QUALITY CONTROL

A. Mortar:

1. If standard gray mortar begins to stiffen, it may be retempered by adding water and remixing unless prohibited by water repellent admixture manufacturer.

   a. Standard gray mortar shall not be retempered more than one (1) time.

2. Colored mortar shall not be retempered.
3. All mortar and pointing grout must be used within 1-1/2 HRS maximum after initial mixing.

B. Owner’s Representative reserves right to alter mix design based on initial rate of absorption of masonry units.

C. Masonry Grout:

1. Use grout within 1-1/2 HRS maximum after initial mixing.
2. Use no grout after it has begun to set.

3. Do not retemper grout after initial mixing.
4. Place grout in lifts not exceeding 4 FT.

D. Masonry Grout Testing:

1. Testing and inspection services will be provided by the Owner's special masonry inspector.
   a. Do not include in the bid price the cost of these services.
2. Conduct compressive strength tests and slump tests on all masonry grout used during masonry construction.
3. Perform all compressive strength test sampling, testing and reporting per ASTM C1019.
4. Perform all slump test sampling, testing, and reporting per ASTM C143.
5. Frequency of sampling: One (1) sample (three (3) specimens) collected each grouting operation during masonry construction.
6. Compressive strength testing:
   a. One (1) strength test shall be the average of three (3) specimens from the same sample, tested at 28 days.

3.3 OWNER TRAINING (NOT USED)

END OF SECTION

SECTION 04 05 23

MASONRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Masonry accessories.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 04 21 13 – Brick Masonry.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
   b. A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   c. Delete ASTM A167 if not using cavity wall construction or any through wall flashing.
   d. A951, Standard Specification for Steel Wire for Masonry Joint Reinforcement.
      1) A1008 – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
   e. D624 – Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
   f. D2287 – Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
2. Building code:
   a. International Code Council (ICC):

1) International Building Code and associated standards, 2012 Edition including all amendments, referred to herein as Building Code.

B. Mock-Ups:

Provide specified products for inclusion into mock-up panels required by Specification Section 04 21 13 – Brick Masonry Coordinate with built-in items .

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
   c. Detailed drawings of all factory or field formed stainless steel thru wall flashing.
   d. Tear resistance of flashing material.
   e. Manufacturer's recommendations for flashing adhesive.
   f. Manufacturer's data sheet on each product.

1.5 WARRANTY (NOT USED)

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Weep vents for cavity wall construction:
   a. Dur-O-Wal Inc.
   b. Heckman Building Products Inc.
   c. Hohmann & Barnard, Inc.
   d. Wire Bond.
   e. Mortar Net USA, Ltd.
2. Reglets:
   a. Hohmann & Barnard, Inc.
   b. W. P. Hickman Co.
   c. Superior Concrete Accessories, Inc.

3. Masonry anchors, horizontal joint reinforcing veneer anchorage system and miscellaneous anchors:
    a. Dur-O-Wal.
    b. Heckman.
    c. Hohmann & Barnard, Inc.
    d. Wire Bond.
4. Thru wall flashing:
    a. EPDM:
        1) Carlisle Syntech Systems, Inc.
        2) Firestone Building Products Co.
    b. Stainless steel:
        1) Heckman Building Products.
        2) Hohmann & Barnard, Inc.
5. Weep joint mortar protection system:
    a. Mortar Net USA, Ltd.
    b. Hohmann & Barnard, Inc.
    c. Wire Bond.
6. Preformed control joint inserts:
    a. Dur-O-Wal.
    b. Hohmann & Barnard, Inc.
7. Grout screen:
    a. Wire Bond.
    b. Dur-O-Wal.
    c. Heckman Building Products.
    d. Hohmann & Barnard, Inc.
8. Rebar Positioners:
    a. Wire Bond.
    b. Approved Equal

B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MANUFACTURED UNITS

A. Thru Wall Flashing :
    1. 40 mil EPDM manufactured specifically for thru wall flashing.

a. Tear resistance: ASTM D624, 150 LB/IN minimum.

b. Width as required.

1) Provide single piece full width, no horizontal joints will be allowed unless approved in writing by Owner's representative.

c. Factory precut wherever possible.

d. Factory fabricated inside and outside corners when available.

B. Flashing Adhesive: As recommended by flashing manufacturer for sealing laps, sealing to vertical masonry and concrete surfaces and sealing to stainless steel surfaces.

C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.

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

a. Mortar Net USA, Ltd.; Blok-Flash.

D. Weep Vent:

1. 90 percent open mesh vent designed to be placed in vertical mortar joint.

2. Mortar Net USA, Ltd. "Mortar Net Weep Vents."

3. Color: To match mortar color, and as approved by Owner's Representative.

E. Reglets:

1. Products specified are manufactured by Hohmann & Barnard, Inc.

2. For masonry construction: Type #MR - Masonry Reglet.

3. For concrete construction: Type #CR - Concrete Reglet.

F. Veneer Anchorage System for New Concrete Back-up:

1. Anchors, dovetail:

a. Hot-dipped galvanized, ASTM A153. 16 GA corrugated steel with dovetail.

1) 1 IN wide x 5 1/2 IN long minimum or as required by Project conditions.

a) Provide minimum 2 IN embedment into veneer mortar joint.

2. Dovetail slots:

a. Hot-dipped galvanized, ASTM A153. 22 GA steel.

b. 1 IN wide, 1 IN deep, nominal 5/8 IN throat with filler.

G. Veneer Anchorage System for Existing Concrete or Concrete Masonry Back-up:

1. Adjustable pintle and plate:
   a. Conform to ASTM A951.
   b. Cold drawn steel wire pintle, ASTM A82
   c. 14 GA steel plate, ASTM A1008.
   d. Specifier: Omit the following sentence if using stainless steel.
   e. Galvanized, ASTM A153, Class B2.
   f. 3/16 IN DIA wire x length required to embed pintle minimum 2 IN into veneer mortar joint.
   g. Dur-O-Wal #D/A 213.

H. Horizontal Joint Reinforcing:

1. General:
   a. Conform to ASTM A951.
   b. Cold drawn steel wire, ASTM A82.
   c. 9 GA cross rods.
      1) Hot-dipped galvanized, ASTM A153.
      2) Prefabricated corner and tee sections with minimum length of 30 IN from point of intersection.
2. Single wythe wall joint reinforcing:
   a. Ladder design at walls with vertical reinforcing.
   b. Truss design at walls without vertical reinforcing.
3. Composite wall joint reinforcing: Ladder design with double side rod.
4. Cavity wall joint reinforcing with masonry back-up:
   a. Ladder design horizontal joint reinforcing.
   b. Wire eyes welded to horizontal joint reinforcing.
      1) Length as required to project through rigid insulation into airspace.
   c. 3/16 IN DIA adjustable pintle veneer anchors.
      1) Length as required to provide minimum 2 IN embed into veneer mortar joint.
   d. Dur-O-Wal "LADUR-EYE."

I. Anchors at Intersecting Load-Bearing Walls (Rigid Steel Masonry Anchors): 1 x 1/4 x 24 IN (or length as shown on Drawings or as required by wall condition) hot-dipped galvanized steel ASTM A153 2.0 OZ zinc/SF minimum coating, with ends turned up 2 IN.

J. Grout Screen:

1. Polypropylene monofilament.
2. 1/4 x 1/4 IN mesh.
3. Width of grout screen to be 2 IN less than nominal width of CMU.

K. Weep Joint Mortar Protection System:

1. 100 percent recycled polyester.
2. 90 percent minimum open weave mesh.
3. Minimum 10 IN high by full width of air cavity.

L. Preformed Control Joint Inserts:

1. ASTM D2287.
2. Hardness: 85 durometer.
3. Shear strength: Minimum 2831 LBS/per/FT/joint.
4. Dur-O-Wal #D/A 2002 or Hohmann & Barnard #VS Series.

M. Glass Unit Masonry Panel Reinforcing:

1. Conform to ASTM A951.
2. 9 GA galvanized steel wire, ASTM A153 minimum G60.
   a. Ladder type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Thru Wall Flashing:

1. Install to provide positive drainage of cavity moisture.
2. Extend flashing horizontally beyond each edge of lintel or sills to next vertical mortar joint but not less than 4 IN and turn up edge one (1) full veneer course.
   a. Seal all joints.
3. Where thru wall flashing steps up or down in the wall, provide end dam at step.
   a. End dam shall extend up or down to tie into thru wall flashing step.
   b. Seal all joints for continuous watertight barrier.

4. Adhere vertical surface of flashing to back-up wall with adhesive recommended by flashing manufacturer.
5. Extend flashing minimum of 6 IN above top of weep joint mortar protection system when possible.
6. Lap and seal flashing at all inside and outside corners to provide continuous uninterrupted barrier.

B. Thru Wall Flashing:

1. Install flashing to provide positive drainage of cavity moisture.
2. Where flashing steps up or down in the wall provide end dam at the step.
   a. End dam shall extend up or down to tie into the thru wall flashing step.
   b. Solder and seal all joints for continuous water and air tight barrier.
3. Lap flashing 2 IN.
   a. Seal all laps by applying two (2) beads of lap sealant on each side of the lap joint.
   b. Sealant beads shall extend full width of flashing both vertical and horizontal surfaces.
   c. Provide means for maintaining drip leg alignment at lap.
4. Install upper edge of flashing into as shown on Drawings.

C. Weeps:

1. Provide open weep joints at maximum 16 IN OC in head joint of first course of veneer immediately above thru wall flashing.
   a. Omit mortar bed on top of thru wall flashing at each open weep joint location to allow moisture an unobstructed path to the exterior.
   b. Specifier: Use 4 IN option using have CMU veneer.
   c. Weep joints shall be not more than one (1) brick course high.
2. Provide weep vents maximum 16 IN OC in top course of veneer or as indicated on Drawings.
   a. Do not use weep vents in weep joints at the bottom of the wall.
   b. Set weep vents back away from face of veneer slightly so the front edge of the vent is contained within the mortar joint.

D. Weep Joint Mortar Protection System:

1. Install continuous row(s) of material.
2. Provide multiple thicknesses of material compressed as required to completely fill the entire air cavity.

a. Thickness to be at least 10 percent wider than air cavity being filled.

3. Set material directly on top of thru wall flashing.

E. Butt joints of preformed control joint inserts tightly together and secure with adhesive or sealant acceptable to insert manufacturer.

F. Anchoring Veneer:

1. Veneer with concrete block back-up:

a. Anchor veneer to new construction using horizontal joint reinforcing and adjustable pintle veneer anchors

b. Anchor veneer to existing construction using adjustable pintle and plate at 16 IN OC vertically.

2. Veneer with concrete back-up:

a. Anchor veneer to new construction using dovetail anchors and slots.

b. Anchor veneer to existing construction using adjustable pintle and plate.

c. Provide veneer anchorage at not more than 16 IN OC vertically and 16 IN OC horizontally.

G. Reinforcing Masonry:

1. General:

a. Provide continuous horizontal joint reinforcing in all concrete masonry wall construction.

1) Embed longitudinal side rods in mortar for entire length with minimum cover of 5/8 IN on exterior side of walls and 1/2 IN at other locations.

2) For interior partitions, the "exterior" side of the wall is considered the side having the most corrosive atmosphere or the corridor side of the wall.

3) Lap reinforcement minimum of 12 IN at ends.

4) Remove cross wires on one (1) side of the lap splice and bend the side rods slightly so the lap is provided with 12 IN of uninterrupted wire lap occurring in the same plane.

5) Do not bridge control joints with horizontal joint reinforcing.

6) Do not bridge expansion joints with horizontal joint reinforcing.

7) At corners and wall intersections use prefabricated "L" and "T" horizontal joint reinforcing sections.

8) Cut and bend as required.

9) Install reinforcing at 16 IN OC vertically unless noted otherwise on Drawings.

10) Install reinforcing 8 IN OC vertically for a minimum of 24 IN at starter courses.

a) Do not install horizontal joint reinforcing in veneer mortar joint having through-wall flashing.

11) In concrete masonry, install horizontal joint reinforcing at 8 IN OC in parapets.

a) Parapets begin at the course immediately above the top of the roof structural member or top of concrete topping slab on precast roof structure.

12) In concrete masonry, install additional horizontal joint reinforcing 16 IN OC in courses on each side of vertical control joints and on each jamb of openings for full height of joint or opening.

a) Alternate with normal wall horizontal joint reinforcing.

b) Extend reinforcing minimum 32 IN beyond joint or jambs of opening.

13) In concrete masonry, reinforce masonry openings over 12 IN wide with horizontal joint reinforcing placed in three (3) horizontal joints above lintel and two (2) horizontal joints below sill.

a) Extend minimum of 32 IN beyond jambs of opening.

2. Reinforcing concrete masonry:

a. At intersecting (interior/exterior or interior/interior) load-bearing walls, provide rigid steel anchors 16 IN OC vertically, embed ends in grout filled cores.

1) Alternate rigid steel anchors with horizontal joint reinforcing.

b. At intersecting non-load bearing walls or at intersecting (interior/exterior or interior/interior) load bearing/non-load bearing walls provide grout screen in mortar joint at 16 IN OC vertically.

1) Extend minimum 6 IN into each wall.

2) Alternate grout screen with horizontal joint reinforcing.

c. Install vertical reinforcing bars where indicated on Drawings.

1) Provide means necessary to ensure position of vertical steel reinforcing meets requirements of Building Code.

d. Anchor intersecting concrete masonry (regardless of load bearing capacity) to intersecting concrete or concrete back-up using dovetail slots and anchors.

1) Provide dovetail anchors at 16 IN OC or as noted on Drawings.

3. Provide column ties at all masonry wall and steel column intersections.

a. Provide column ties at 16 IN OC on every side of column where masonry wall abuts column.

b. Alternate column ties with horizontal joint reinforcing when possible.

c. Fill block cells with grout at column tie locations.

4. Repair all galvanized coatings damaged as a result of welding.

a. See Specification Section 05 50 00 – Metal Fabrications for galvanizing repair system.

5. Reinforcing veneer:

a. Reinforce veneer with joint reinforcement placed in veneer mortar joints:

1) In new masonry back-up construction alternate veneer horizontal joint reinforcing with composite wall horizontal joint reinforcing.

2) In new concrete back-up construction alternate veneer horizontal joint reinforcing with dovetail anchors.

3) In existing concrete or masonry back-up construction alternate veneer reinforcing with adjustable pintle and plate type veneer anchorage system.

4) In new or existing stud wall back-up construction alternate veneer reinforcing with mechanical veneer anchorage system.

H. Install reglets as walls are being constructed.

1. Set reglets true with wall, plumb and at consistent depth.

I. Remove all excess mortar and grout from reglets as walls are being constructed and protect reglet openings from filling with mortar, grout and other construction debris.

3.2 OWNER TRAINING (NOT USED)

END OF SECTION

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SECTION 04 21 13

BRICK MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brick masonry.
2. Specification Section is applicable to office building.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 04 01 20 – Masonry Cleaning.
4. Section 04 05 13 – Cement and Lime Mortars.
5. Section 04 05 23 – Masonry Accessories.
6. Section 07 90 00 – Joint Protection.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. C216 – Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).

B. Mock-Ups:

1. After final brick selection has been made and prior to permanent wall construction, construct mock-up, minimum 4 FT high x 8 FT long, utilizing all specified components of exterior wall for Owner's Representative review and acceptance.
2. Mock-up shall constitute minimum standard of quality for actual construction.
   a. Maintain mock-up during construction.
3. If not acceptable, construct additional mock-ups as required.
4. Remove when directed.
5. Mock-up to include all special corners and other special brick detailing including all special shapes.

a. Step construction of mock-up to allow observation of all specified components.

b. Mock-up shall include as a minimum all special shapes, all types of brick coursing, cavity insulation, veneer horizontal joint reinforcing, thru wall flashing, weep joints, weep joint mortar protection system and weep vents, minimum 12 IN long brick support angle properly flashed, typical control joint construction and liquid water repellent.

1) Mock-up shall include inside and outside corner showing thru wall flashing lapping, jointing and sealing.

2) Mock-up shall include example of flashing condition at bearing end of lintels as outlined in Specification Section 04 05 23 – Masonry Accessories.

3) Cavity wall flood test:

a) Mock-up cavity shall be dammed at each end and all weep joints shall be plugged.

b) Cavity shall be flooded with water minimum 16 IN deep.

c) Weep joints shall then be unplugged and cavity shall be allowed to drain to demonstrate effectiveness of weep joints.

d) Owner's representative shall witness demonstration.

e) Test will be considered acceptable if no standing water remains in cavity after a period of 15 minutes.

f) Correct deficiencies identified by Owner's Representative and retest until acceptable to Owner's Representative.

C. All brick provided on this Project shall be from same production run.

1. Produce special shapes and solid units in manner which will ensure matching of color and texture with field brick.

a. Solid units shall be 100 percent solid.

2. Special shapes shall be factory fabricated unless noted otherwise.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

b. Manufacturer's installation instructions.

3. Results of cavity wall flood test.

B. Samples:

1. Minimum 12 x 12 IN banded brick sample incorporating actual brick and mortar color being used on Project for Owner's Representative review.
2. Samples of all special shapes prior to incorporating into mock-up.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver units on pallets with tight covers or deliver in cubes and store on dunnage.

B. Inspect masonry upon delivery to assure color match with mock-up and dimensional quality and trueness of brick units.

C. Remove unacceptable units from the Project Site.

1.6 WARRANTY (NOT USED)

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Brick: Acme.

B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MATERIALS

A. Brick:

1. Size: Match existing brick.
2. Color range: Match existing brick
3. ASTM C216, Type FBS, Grade SW.
4. Include in bid special shaped, sized or cut brick units required for complete installation.
   a. Special shaped brick shall be fabricated in manufacturing plant and shall not be field fabricated by saw cutting unless otherwise noted.

B. Accessories: See Specification Section 04 05 23 – Masonry Accessories.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Verify that all required accessory items are correct.

C. General:

1. Build cavity walls to thickness indicated.
2. Build single-wythe walls to actual thickness of masonry units.
3. Build composite walls to thickness indicated.
4. Build in flashing, reinforcing, weeps, vents and related accessory items.
    a. See Specification Section 04 05 23 – Masonry Accessories for installation of accessory items.
5. Install field brick in stack bond.
    a. Provide special coursing where indicated on the Drawings.
6. Perform all cutting with masonry saws using saw blades as recommended by masonry unit manufacturer.
7. Drill holes with power drill using drill bits as recommended by masonry unit manufacturer.
8. Holes made by chipping not acceptable.
9. Cut as required to provide pattern required.
10. Use 100 percent solid units where cutting or laying would expose holes.
    a. Fill solid with mortar all units in first course directly below thru wall flashing.
    b. Miter all brick at corners.
11. Avoid use of less than half size units whenever possible.
12. Do not install damaged units.
13. Wet brick having absorption rates greater than 0.025 OZ/SI/MIN.
    a. Wet brick in accordance with manufacturer's instructions.
14. Install brick work in conjunction with concrete unit masonry work.

D. Laying and Tooling:

1. Lay out walls in advance for uniform and accurate spacing of bond patterns and joints.
    a. Properly locate openings, movement type joints, returns and offsets.
2. Lay brick with completely filled bed and head joints except at weep locations.
    a. Omit mortar from head joint at weep joint locations.
    b. Butter ends with sufficient mortar to completely fill head joints and shove into place.
    c. Do not slush head joints.
    d. See Specification Section 04 05 13 – Cement and Lime Mortars for mortar and grout.

3. Maintain nominal 3/8 IN joint widths.
    a. Cut joints flush where concealed.
    b. Tool exposed joints concave.
    c. Compress mortar in below grade joints.
    d. Provide wider joints where noted on the Drawings.
    e. Where brick sets on top of steel support, omit the mortar joint on top of the support under the brick and set the brick directly on the thru wall flashing or the steel support member unless a mortar joint is required to maintain coursing.
4. During tooling of joints, enlarge any voids or holes, except weep joints, and completely fill with mortar.
5. Point-up all joints at corners, openings and adjacent work to provide neat, uniform appearance.
6. Remove brick units disturbed after laying.
    a. Clean and relay in fresh mortar.
    b. Do not pound units to fit.
    c. If adjustments are required, remove units, clean and reset in fresh mortar.
7. Where work is stopped and later resumed, rake back 1/2 brick unit length in each course.
    a. Wet units lightly.
    b. Remove loose units and mortar prior to laying fresh masonry.
8. As work progresses, build-in items indicated and specified.
    a. Fill in solidly with mortar around built-in items.

E. Control Joints and Sealants:
1. Provide vertical expansion, control and isolation joints where indicated.
    a. Where not indicated provide at maximum 16 FT OC.
    b. Rake out all mortar from joint.
        1) Exercise care not to damage thru wall flashing when cleaning mortar from vertical joints.
    c. Locate control joints at points of natural weakness in masonry.
2. See Specification Section 07 92 00 – Joint Sealants for sealant installation requirements.

3.2 FIELD QUALITY CONTROL

A. Protect against weather when work is not in progress.

1. Cover top of walls with waterproof translucent membrane, extend at least 4 FT down both sides of wall and anchor in place.

B. Protect against cold and hot weather as specified in Specification Section 04 00 50 – Cold and Hot Weather Masonry Construction.

C. Remove and replace loose, stained, or damaged bricks.

1. Provide new units to match.
2. Install in fresh mortar.
3. Point to eliminate evidence of replacement.

D. Tolerances:

1. Maximum variation from plumb in vertical lines and surfaces of columns, walls and arises:
   a. 1/4 IN in 10 FT.
   b. 3/8 IN in a story height not to exceed 20 FT.
   c. 1/2 IN in 40 FT or more.
2. Maximum variation from plumb for external corners, expansion joints and other conspicuous lines:
   a. 1/4 IN in any story or 20 FT maximum.
   b. 1/2 IN in 40 FT or more.
3. Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:
   a. 1/4 IN in any bay or 20 FT.
   b. 1/2 IN in 40 FT or more.
4. Maximum variation from plan location of related portions of columns, walls and partitions:
   a. 1/2 IN in any bay or 20 FT.
   b. 3/4 IN in 40 FT or more.
5. Maximum variation in cross-sectional dimensions of columns and thicknesses of walls from dimensions shown on Drawings:
   a. Minus 1/4 IN.
   b. Plus 1/2 IN.

E. Inspect wall to ensure that mortar droppings have not plugged weep joints or weep vents.

3.3 CLEANING

A. Clean brick masonry as wall is being constructed using fiber brush, wooden paddles and scrapers.

1. After all brick construction is complete, wash wall using specified brick cleaning solution.
2. Refer to Specification Section 04 01 20 – Masonry Cleaning.

3.4 OWNER TRAINING

END OF SECTION

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SECTION 07 21 00

BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building insulation.
2. Specification Section is applicable to exterior walls as needed

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 04 21 13 – Brick Masonry.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
   b. C665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
   c. C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
   d. E96 – Standard Test Methods for Water Vapor Transmission of Materials.
2. Underwriters Laboratories, Inc. (UL):
   a. Building Materials Directory.

B. Mock-Ups:

1. Provide insulation for mock-ups required in Specification Section 04 21 13 – Brick Masonry

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Manufacturer's installation instructions.
    c. Manufacturer's recommendations on sealants, tapes and mastics.

B. Miscellaneous Submittals:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Certification from insulation manufacturer stating that insulation proposed is acceptable for intended use per the Drawings.

1.5 SITE CONDITIONS (NOT USED)

1.6 WARRANTY (NOT USED)

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contact Documents, the following manufacturers are acceptable:
1. Rigid extruded polystyrene board insulation:
    a. Dow.
    b. Dyplast Products.
    c. Diversifoam Products.
    d. PACTIV.
    e. Owens Corning.
2. Blanket or batt thermal insulation:
    a. Owens-Corning Fiberglass Corp.
    b. United States Gypsum Company (USG).
    c. CertainTeed.
3. Sound control insulation:
    a. Thermafiber.
4. Vapor retarder:
    a. Raven Industries.
    b. Reef Industries.
    c. Fortifiber Corp.
    d. Alumiseal.

B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MATERIALS

A. Rigid Polystyrene Board Insulation:

1. Extruded: ASTM C578, Type IV.
2. Compressive strength: 25 psi minimum.
3. Density: 1.6 pcf minimum.
4. Water vapor transmission: ASTM E96, 1.1 perm-IN maximum.
5. Water absorption: 0.3 percent maximum.
6. Thermal resistance (R value at 75 DegF): 5.0/IN.
7. Minimum thickness as noted on Drawings.
8. Provide insulation designed for intended use.

B. Sealant and Mastic (for setting polystyrene and/or polyisocyanurate insulation board): Manufacturer's recommended standard.

C. Blanket or batt thermal insulation, glass or other inorganic fibers and resinous binders formed into flexible blankets or semi-rigid sheets.

1. ASTM C665, Type II, Class C.
2. Thermal conductivity (k-value at 75 DegF): 0.27.
3. Foil faced
4. Minimum thickness as noted on Drawings.

D. Vapor Retarder:

1. Fire rated, reinforced, 3 ply, Class 1 material.
2. Perm rating: Not exceeding 0.035 grains/HR-FT^2-IN-Hg when determined in accordance with ASTM E96.
3. Griffolyn "TX-1200FR."

E. Vapor Retarder Tape: As recommended by vapor retarder manufacturer.

F. Sound Control Insulation:

1. Glass or other inorganic fiber and resinous binders formed into flexible blankets or semi-rigid sheets.
   a. ASTM C665, Type I.
   b. UL listed when used in fire rated construction.
2. Minimum K-value: 0.32 Btu-IN/HR FT^{2}F.
3. Thickness: As noted on Drawings
4. Thickness: As noted on Drawings.

5. Unfaced, friction fit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. General:

1. Insulate full thickness over surfaces to be insulated.
2. Fit tightly around obstructions, fill voids.
3. Cover all penetrations (electrical junction boxes, switch boxes, piping, conduits, etc.) with insulation, taking care not to compromise the workings of the device.
4. Seal all joints with sealant or tape as applicable.
5. Seal or tape to abutting materials to maintain vapor retarder integrity.
6. Fit butted joints of batt or blanket insulations tightly together.
7. Apply single or double layer to achieve total thickness.
    a. If double layer is provided stagger all joints minimum 12 IN.
8. Do not use broken or torn pieces of insulation.
9. Install so that completed installation is vapor tight.
10. If vapor retarder tape fails to adhere to any surface, apply sprayed-on adhesive as recommended by tape manufacturer to promote adhesion.

C. Blanket or Batt Insulation with or without Vapor Retarder:

1. Set with vapor retarder (where specified) to warm side of wall.
    a. Install with vapor retarder flanges over the edge of the framing member.
    b. Do not obstruct ventilation spaces.
2. Fill all miscellaneous voids and where indicated on Drawings.
3. Tape joints and ruptures in vapor retarder.
4. Use vapor retarder tape and seal each area of insulation to surrounding construction to assure continuous vapor-tight installation.
5. At Contractor's option, provide blanket or batt insulation without vapor retarder and provide separate vapor retarder as specified.

D. Rigid Board Polystyrene or Polyisocyanurate Insulation in Cavity Walls:

1. Provide insulation manufactured specifically for use in cavity wall construction.
2. Do not proceed with installation until subsequent work which conceals insulation is ready to be performed.

3. Extend insulation full thickness over entire area to be insulated.
   a. Cut and tightly fit around all penetrations.
4. Set each piece of insulation flush with the abutting piece to eliminate ledges in the face of the insulation.
5. Install mastic on face of concrete or masonry back-up in accordance with mastic and insulation manufacturer's recommendation.
6. Press courses of insulation between wall ties (horizontal reinforcing) with edges butted tightly both ways.
7. Set units firmly into mastic.
8. Seal all horizontal and vertical joints with sealant recommended by insulation manufacturer.
9. Do not use damaged insulation.

E. Rigid Polystyrene Board or Polyisocyanurate Insulation at Perimeter Below Grade:
   1. Provide insulation manufactured specifically for use in below grade applications.
   2. Install insulation below grade outside foundation walls.
   3. Install in mastic with tight joints.
   4. Where footings are located below the design frost line, extend insulation down to the design frost line or, if so indicated on the Drawings, beyond the design frost line.
   5. Where footings are located at the design frost line, extend insulation down to top of footing or as indicated on Drawings.
   6. Protect from damage and/or displacement during backfilling and/or pouring of floor slab.

3.2 FIELD QUALITY CONTROL

A. Repair or replace damaged insulation as directed by Owner’s representative.

3.3 OWNER TRAINING (NOT USED)

END OF SECTION

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SECTION 07 27 29

LIQUID-APPLIED ROUGH OPENING FLASHING MEMBRANE
FOR RESTORATION OF EXISTING CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:
   1. Window and door flashing restoration, using a liquid applied air and water barrier membrane system, and accessory materials for application to existing exterior building envelope substrates, as indicated on the drawings.

A. Related Requirements:
   1. Section 01 33 00- Submittal Procedures.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 REFERENCES

A. The date of the standard is that in effect as the date of receipt of bids for the project.

B. ASTM International (ASTM).

1.4 ADMINISTRATIVE REQUIREMENTS:

A. Pre-installation conference: Prior to beginning installation of the fluid applied rough opening system, hold a pre-installation conference to review work to be accomplished.
   1. Owner’s Representative, Contractor, Architect, installing subcontractor, membrane system manufacturer's representative, roofing and foundation subcontractors, waterproofing subcontractors, and all subcontractors who have materials penetrating membrane system or finishes covering membrane system shall be present.
   2. Contractor shall notify Architect at least seven days prior to time for conference.
   3. Contractor shall record minutes of meeting and distribute to attending parties.
   4. Agenda: As a minimum discuss:
      a. Surface preparation of restoration area and surrounding wall interfaces.
      b. Existing substrate condition and pretreatment.
      c. Minimum curing period.
      d. Special details and/or sheet flashing for liquid applied rough opening installation.
      e. Sequence of construction, responsibilities, and schedule for subsequent repair operations.
      f. Installation procedures.
      g. Inspection procedures.

h. Protection and repair procedures.
i. Review and approval of all glazing applications to include the installation of the windows and related interior perimeter sealant joint.

1.5 PERFORMANCE REQUIREMENTS:

A. Performance requirements: Comply with the specified performance requirements and characteristics as herein specified.

B. Performance description:
   1. Wall penetrations (windows, doors, etc.) shall be constructed with a continuous, air and water barrier to control water and air leakage into and out of the conditioned space around the [existing] [new] windows and doors replacements.
   2. Joints, penetrations and paths of water and air infiltration shall be made watertight and airtight.
   3. System shall be capable of withstanding positive and negative combined wind, stack and HVAC pressures on the rough openings and building envelope without damage or displacement.
   4. System shall be installed in an airtight and flexible manner, allowing for the relative movement of remediated systems due to thermal and moisture variations.

1.6 SUBMITTALS:

A. Product data: Submit manufacturer's product data and installation guidelines including membrane and accessory material types, technical and test data, composition, descriptions and properties, installation instructions and substrate preparation requirements.

B. Certificates:
   1. Certificates by manufacturer stating that manufacturer and installer meet qualifications as herein specified.

C. VOC Certification: Submit certification that products furnished comply with regulations controlling use of volatile organic compounds (VOC).

1.4 QUALITY ASSURANCE:

A. Applicable standards, as referenced herein: ASTM International (ASTM).

B. Manufacturer's qualifications: Air and water barrier systems shall be manufactured and marketed by a firm with an Air Barrier Association of America membership for at least five [5] years. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include certification of ABAA membership for a least five [5] years.

C. Installer's qualifications: The installer shall demonstrate qualifications to perform the work of this section by submitting the following:

1. Verification that installer has been trained by and is approved to perform work as herein specified by air and water barrier system manufacturer.
2. List of at least three (3) projects completed of similar scope and complexity to this project carried out by the firm and site supervisor.

D. Inspection and testing: Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover installed products or assemblies until they have been inspected, tested and approved.

E. Sole source: Obtain materials within the scope of this specification from a single manufacturer.

F. Regulations: Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOC).

G. Mock-up:
   1. Prior to installation and start of Work of the fluid applied rough opening system a field-constructed mock-up shall be applied to verify details and tie-ins, to demonstrate the required installation.
      a. Construct a typical exterior wall section, 8 feet long and 8 feet wide, incorporating backup wall, cladding, window, door frame, sill, penetrations, insulation, flashing and any other critical junction.
      b. Allow 72 hours for inspection and testing of mock-up before proceeding with water and air barrier work.
      c. Coordinate construction of mockups to permit inspection by Owner's Representative of air barrier before beginning installation.
      d. Approved, undamaged mock-up must remain as part of the work.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations. Remove damaged material from site and dispose of in accordance with applicable regulations.

B. Protect air and water barrier components from freezing and extreme heat.

C. Sequence deliveries to avoid delays, and to minimize on-site storage.

1.6 FIELD CONDITIONS:

A. Environmental conditions:
   1. Comply with manufacturer's written instructions for substrate temperature and moisture content and other conditions affecting performance requirements.

B. Weather conditions:

1. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used.

C. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive the membrane system.

1.7 WARRANTY:

A. Manufacturer's warranty requirements:
   1. Submit manufacturer's five (5) year limited warranty stating:
      a. The products have been tested in accordance with national standards for air and water-resistive barriers and passed those tests with effectiveness and durability indicating their suitability for performance as an air and water-resistive barrier system when properly applied.
      b. The products shall be free from defects in material for a period of [five] years after the substantial completion of the material application.
      c. That the products will not disintegrate and will maintain their integrity over the life of the warranty.

B. Warranty period: Five (5) years from Date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANFACTURERS

A. Substitutions: In accordance with Section 01 25 00 – Substitution Procedures.

2.2 MATERIALS

A. WATER BASED PRIMER FOR RAW GYPSUM BOARD EDGES

   1. Primer to seal the cut edges of gypsum wall boards where they are exposed in rough openings for windows and doors. The sealed edge makes a compatible surface for easy application of liquid applied fiber-reinforced fill coat and seam treatment for through-wall components.
      a. Product: PROSOCO R-Guard PorousPrep, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, or equal.

   2. Subject to compliance with the following physical and performance requirements:
      a. Breathable liquid primer.
      b. Comply with national, state and district AIM VOC regulations and be 100 g/L or less.
      c. Total Solids: 16 percent.

B. LIQUID APPLIED FILL COAT AND SEAM FILLER

   1. High modulus, gun-grade, crack and joint filler, adhesive and detailing compound that combines the best silicone and polyurethane properties. The single-component, Silyl-Terminated-Polymer (STP) prepares open joints,

seams and cracks before installing primary water and air barrier system to prevent the movement of water and air through building envelopes.
   a. Product: PROSOCO R-Guard Joint & Seam Filler, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, or equal.

2. Subject to compliance with the following physical and performance requirements:
   a. Comply with national, state and district AIM VOC regulations and be 30 g/L or less.
   b. Water vapor transmission: Minimum 19 perms at 20 mils when tested in accordance with ASTM E-96.
   c. Tensile strength: 70 psi when tested in accordance with ASTM D412.
   d. Elongation at break: Greater than 180 percent when tested in accordance with ASTM D412.
   e. Peel strength: Greater than 25 pli when tested in accordance with ASTM D1781.
   f. Total solids: 99 percent.

   a. Product: PROSOCO R-Guard FastFlash manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, or equal.

2. Subject to compliance with the following physical and performance requirements:
   a. AAMA 714-12 Voluntary Specification for Liquid-Applied Flashing Used to Create a Water-Resistive Seal Around Exterior Wall Openings in Buildings.
   b. ICC-ES AC 212 Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers Over Exterior Sheathing.
   c. Comply with national, state and district AIM VOC regulations and be 30 g/L or less.
   d. Water vapor transmission: 21 perms when tested in accordance with ASTM E96.
   e. Tensile strength: Greater than 150 psi when tested in accordance with ASTM D412.
   f. Elongation at break: Greater than 350 percent when tested in accordance with ASTM D412.
   g. Total Solids: 99 percent.

C. LIQUID-APPLIED FLASHING AND DETAILING MEMBRANE

1. Gun-grade, spread and tool or roller apply waterproofing, adhesive and detailing compound that combines the best of silicone and polyurethane properties. The single component, Silyl-Terminated-Polymer (STP) produces a highly durable, seamless, elastomeric flashing membrane in rough openings, to fill joints and seams, to counter flash and transition waterproofing and air barrier components in new wall assemblies, and to seal around penetrations or protect countersunk fasteners.
   a. Product: PROSOCO R-Guard FastFlash manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, or equal.

2. Subject to compliance with the following physical and performance requirements:
   a. AAMA 714-12 Voluntary Specification for Liquid-Applied Flashing Used to Create a Water-Resistive Seal Around Exterior Wall Openings in Buildings.
   b. ICC-ES AC 212 Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers Over Exterior Sheathing.
   c. Comply with national, state and district AIM VOC regulations and be 30 g/L or less.
   d. Water vapor transmission: 21 perms when tested in accordance with ASTM E96.
   e. Tensile strength: Greater than 150 psi when tested in accordance with ASTM D412.
   f. Elongation at break: Greater than 350 percent when tested in accordance with ASTM D412.
   g. Total Solids: 99 percent.

D. INTERIOR SEALANT FOR WINDOWS AND DOORS

1. High performance, gun-grade waterproofing sealant that combines the best of silicone and polyurethane properties. Single component, Silyl-Terminated-Polymer (STP) that is durable, and stops the movement of moist air through cracks surrounding windows and doors.
   a. Product: PROSOCO R-Guard AirDam, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, or equal.

2. Subject to compliance with the following physical and performance requirements:
   a. Comply with national, state and district AIM VOC: less than 30 grams per Liter
   b. Sealant Validation from Sealant Waterproofing & Restoration Institute (SWRI).
   c. Elongation at break: Greater than1000 percent when tested in accordance with ASTM D412.
   d. Peel strength: 25 pli when tested in accordance with ASTM C794
   e. Total solids: 98 percent.

3. Backer rod: In deep joints, control sealant depth by installing closed cell backer road. Diameter of the soft-backer rod should be 25 percent greater than the joint width. Do not puncture backer rod.

PART 3 - EXECUTION

3.1 EXAMINATION AND SURFACE PREPARATION

A. Examine conditions for compliance with system manufacturer’s requirements for installation, and other specific conditions affecting performance of air and water barrier system.

B. All surfaces must be sound, clean and free of grease, dirt, excess mortar or other contaminants. Fill or bridge damaged surfaces, voids or gaps larger than one- inch. Fill voids and gaps measuring one- inch or less with liquid applied fill coat and seam filler as necessary to ensure continuity.
   1. Surfaces to receive STP) fluid applied accessories must be dry, damp or wet to the touch. Brush away any standing water present before application. The products will tolerate rain immediately after application.

C. Refer to manufacturer's product data sheets for requirements for condition of and preparation of substrates.
   1. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
   2. Remove contaminants such as grease, oil and wax from exposed surfaces.
   3. Remove dust, dirt, loose stone and debris.
   4. Use repair materials and methods that are acceptable to manufacturer of the air and water-resistive barrier system.
   5. Refer to manufacturer's product data sheets and manufacturer's installation guidelines for additional information on preparing structural walls to receive the primary air and water resistive barrier.

D. Exterior sheathing:
   1. Ensure that sheathing is properly installed with ends, corners and edges properly fastened. Remove and replace damaged sheathing.
   2. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing, and spot overdriven fasteners with liquid applied fill coat and seam filler.
   3. Seal the cut edges of gypsum wall boards exposed in rough openings for windows and doors at corners, as recommended by manufacturer.

E. Masonry and concrete substrates:
   1. Masonry head and bed joints should be fully filled and tooled.
   2. Mechanically remove loose mortar fins, mortar accumulations and protrusions, and debris.
   3. Fill cracks, joints and gaps with liquid applied fill coat and seam filler as herein specified.

3.2 FIBER REINFORCED FILL COAT AND SEAM FILLER

A. General: Comply with air and water barrier manufacturer's installation instructions, temperature limitations, product data and shop drawings.

B. Apply liquid applied fill coat and seam filler for seams, joints, cracks, gaps, primed rough gypsum edges at sheathing, and rough openings per manufacturer's written instructions.

3.3 LIQUID APPLIED FLASHING AT WINDOWS, DOORS OPENINGS AND PENETRATIONS

A. General: Comply with air and water barrier manufacturer's installation instructions, temperature limitations, product data and shop drawings.

B. Apply liquid flashing membrane to seal and waterproof rough openings per manufacturer's written instructions. Spread the wet product to create an opaque, monolithic flashing membrane which surrounds the rough opening and extends 4 to 6 inches over the face of the structural wall. Apply additional coats as needed to achieve void- and pinhole-free surface..

3.4 FLUID-APPLIED FLASHING TRANSITIONS

A. General: Comply with water and air barrier manufacturer's installation instructions, temperature limitations, product data and shop drawings.

B. Apply fiber reinforced fill coat and seam filler and liquid flashing membrane as a liquid flashing membrane to waterproof the transitions in rough opening and between dissimilar materials per manufacturer's written instructions.
   1. Fill any voids between the top of the flashing leg and the vertical wall with fiber reinforced fill coat and seam filler.
   2. Spread the wet liquid flashing membrane to create a monolithic "cap-flash" flashing membrane per manufacturer's written instructions.
   3. Apply additional coats as needed to achieve void- and pinhole-free surface.
   4. Allow treated surfaces to skin before installing other wall assembly, waterproofing or air barrier components.

3.5 INTERIOR SEALANT FOR WINDOWS AND DOORS INSTALLATION

A. General: Comply with air and water barrier manufacturer's installation instructions, temperature limitations, product data and shop drawings.

B. Apply interior waterproofing sealant per manufacturer's written instructions.
   1. Install Backer rod: Compressible, closed cell rod stock as recommended by manufacturer for compatibility with sealant. Install Backer Rod as necessary per manufacturer's written instructions.
   2. Apply interior waterproofing sealant in continuous beads without gaps or air pockets.

END OF SECTION

SECTION 07 61 13

METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standing seam metal roofing.
2. Prefinished gutters and downspouts.
3. Roof insulation, vapor retarder, sheathing.
4. Specification Section is applicable to main roof.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 04 05 23 – Masonry Accessories.
4. Section 07 62 00 – Flashing and Sheet Metal.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. American Architectural Manufacturers Association (AAMA):
   a. 621 – Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
2. ASTM International (ASTM):
   a. A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   b. C209 – Standard Test Methods for Cellulosic Fiber Insulating Board.
   c. C1289 – Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
   d. E96 – Standard Test Methods for Water Vapor Transmission of Materials.
   e. E1592 – Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

f. E1646 – Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

g. E1680 – Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

h. F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

3. FM Global (FM):

   a. FM Approval Standard For Class 1 Panel Roofs, Class #4471.

4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):

   a. Architectural Sheet Metal Manual, Sixth Edition, 2003.

5. Underwriters Laboratories, Inc. (UL):

   a. Building Materials Directory.

   b. Fire Resistance Directory.

   c. 580 – Standard for Safety Tests for Uplift Resistance of Roof Assemblies.

6. Building code:

   a. International Code Council (ICC):

      1) International Building Code and associated standards, 2009 Edition including all amendments, referred to herein as Building Code.

B. Qualifications:

1. Manufacturer shall have minimum of 10 years experience in the production of structural standing seam metal roofing.

2. Installing contractor shall be licensed or approved in writing by manufacturer.

3. Contractor and installer shall have minimum of seven (7) years experience in the installation of structural standing seam metal roof systems similar to system specified.

4. Contractor and installer shall have successfully completed two (2) projects of similar size, scope and complexity within past two (2) years.

5. All roll forming performed on-site shall be supervised by personnel trained and employed by the roofing manufacturer.

   a. Roofing manufacturer shall have been engaged in field roll forming for a minimum of 15 years with experience in roll forming long panels similar to panels being used.

C. Mock-Ups:

1. Prior to start of permanent roof construction construct mock-ups of roofing.

a. Mock-ups shall be of sufficient size to properly display all components required by the roofing and soffit system.

b. Mock-ups shall be a minimum 5 FT x 5 FT in size.

c. Provide multiple mock-ups as required.

2. Panels shall be same panels as specified or approved for Project.

a. Exact color is not necessary; however, Contractor is to label each exposed component to identify final installed color of component.

3. Step construction to allow observation of all components.

D. Completed roof system to be inspected by roof manufacturer's authorized factory trained representative prior to issuance of roof warranty.

1.4 DEFINITIONS

A. Installer or Applicator:

1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.

2. Installer and applicator are synonymous.

B. Steep Slope: Having a pitch of 3:12 or greater.

C. Low Slope: Having a pitch less than 3:12 but greater than 1/4:12.

D. PVDF: Polyvinylidene fluoride.

1.5 SYSTEM DESCRIPTION

A. Prefinished steel gutters and downspouts, prefinished aluminum soffit panels, and field-insulated standing seam roof system consisting of exterior panel, field installed insulation, and vapor retarder over sheathing over metal roof deck.

1. Roof panel support and attachment system to be determined by standing seam roof manufacturer.

B. System also includes all masonry metal flashing, counterflashing, and miscellaneous trim required for a complete water and airtight system.

1.6 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.

2. Fabrication and/or layout drawings:

a. Manufacturer prepared computer generated Drawings showing anchorage, flashing, jointing and all other accessories required and all special detailing required by the system.

1) Minimum plan scale: 1 IN = 8 FT.

2) Minimum detail scale: 1-1/2 IN = 1 FT.

b. Provide complete erection plan for each building structure with all details and sections referenced, all penetrations shown, expansion joints shown, detailed and referenced, and all special conditions identified, referenced and detailed.

c. Erection plan to identify limits of each different substrate material (decking).

d. Provide distinction between factory and field assembled work.

3. Product technical data including:

   a. Manufacturer data sheets on each component, including masonry reglets used in the roof system.

   b. Acknowledgement that products submitted meet requirements of standards referenced.

      1) Certification by manufacturer that roofing assembly being supplied has been successfully tested under UL 580 procedures and has achieved a Class 90 rating.

4. Test results:

   a. UL 580, Class 90 test data.

   b. ASTM E1592 test results.

      1) Provide results of tests conducted in accordance with ASTM E1592 for panel size and gage and clip type and spacing similar to panels and clips being used.

   c. ASTM E1646 and ASTM E1680 test results.

   d. Concentrated load test data.

      1) Load test to be conducted on panel size, gage and with clip spacing as required.

5. Qualifications:

   a. Manufacturer: Provide structural engineer qualifications.

   b. Contractor:

      1) Certification of approval or license to install product from manufacturer.

      2) Certification of experience.

      3) Listing of projects completed in the past two (2) years.

      4) Completed projects information to include, square footage of roofing installed, dollar value of roofing installed, manufacturer and type of roofing installed and contact name and telephone number of building Owner.

c. Installer: Provide qualifications of all personnel expected to be working on the Project.

6. Roofing manufacturer's letter of approval for insulation proposed for use.
7. Warranty: Sample language of manufacturer's warranty to be provided on this Project.
8. Structural Engineer's sealed and signed certification stating that system structural components meet the requirements for lateral, upward and downward loads specified.

B. Samples:

1. General: Tag, identify and provide statement regarding use for all fasteners, anchor clips, closures and sealants.
2. Roof panel:
   a. Two (2) samples, full width, 24 IN long.
   b. Provide color selected or specified when possible.
3. Fasteners.
4. Anchor clips.
5. Closures, (both metal and non-metallic).
6. Masonry reglet.
7. Factory and field applied sealants.
8. Color samples:
   a. For initial preliminary color selection, provide manufacturer's color chart showing all colors available.
   b. For final color selection, provide two (2) 2 IN x 3 IN colored metal samples, for each color selected during the initial color selection.

C. Operation and Maintenance Manuals:

1. See Specification Section 01 33 00 – Submittals and Specification Section 01 78 23.13 Operation and Maintenance Data for requirements for:
   a. The mechanics and administration of the submittal process.
   b. The content of Operation and Maintenance Manuals.

D. Miscellaneous Submittals:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Final warranty.

1.7 WARRANTY

A. Provide 10 year complete system warranty, including material for air and weather tightness of entire roof assembly signed by manufacturer.

1. Warranty limits shall meet the minimum load capacity requirements of ASTM E1592.

B. Provide manufacturer's 20 year warranty on panel finish against fading, chipping, cracking and peeling of the panel exterior finish and/or erosion of substrate metal.

1. Repair of panel finish shall be done using material, color and application method to match surrounding panel finish.

C. Warranty period begins on date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Metal roofing products specified are manufactured by Centria

B. Manufacturers listed and other manufacturers not listed, but capable of meeting these specifications, are expected to provide a system with similar profile, standing seam height, spacing, construction and factory applied finish.

C. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Metal roofing:
   a. Centria.
   b. Merchant and Evans - Zip Rib.
   c. Berridge.
   d. MBCI.
   e. Other manufacturers capable of providing structural standing seam system and profiles similar to that specified will be considered.
2. Vapor retarder:
   a. Griffolyn.
3. Insulation: Any manufacturer meeting these specifications and approved by metal roofing manufacturer.
4. PVDF resin:
   a. PPG - DURANAR.
   b. Valspar - Fluropon.
   c. Arkema Inc. - KYNAR 500.
   d. Solvay Solexis - HYLAR 5000.

D. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MATERIALS

A. Roof Panels:

1. General:

a. Steel, ASTM A653, SQ, Grade 37.

1) Galvanized G90 coating.

B. Insulation:

1. Rigid polyisocyanurate.

a. Approved by roofing manufacturer.

C. Perimeter Trim, Panel Closures, Flashing and Counterflashing: Material and factory applied finish to match roof panels.

D. Fasteners: 300 series stainless steel, ASTM F593.

E. Intermediate Support System:

1. Galvanized steel: ASTM A653, SQ, Grade 50, G90 coating.

F. Sealant: Manufacturer's standard.

G. Sheathing: See Specification Section 06 10 00 – Rough Carpentry. (Not applicable to PCS #2).

H. Masonry Reglets: See Specification Section 04 05 23 – Masonry Accessories.

2.3 ACCESSORIES

A. Gutters and Downspouts:

1. Steel, ASTM A653, SQ, Grade 37.

a. Aluminum-zinc coated steel, ASTM A792, SQ, Grade 50B.

b. Minimum thickness: 22 GA.

c. Galvanized G90 coating.

1) Meet requirements of AAMA 621.

2. Gutters:

a. "Style D" gutter per SMACNA Figure 1-2.

1) Seamless except for expansion joints.

b. All exposed surfaces to have finish and color to match roofing metal.

c. Gutter straps and eave closure flashing: Minimum 22 GA to match gutter material, finish and color.

3. Downspouts:

a. SMACNA Figure 1-32B

1) Seam on concealed side of downspout.

2) Provide gutter to downspout connection per SMACNA Figure 1-33B, Detail 1.

b. Downspout straps: Minimum 22 GA with finish and material to match downspout.

c. Finish: To match roof panels.

d. Color: To be selected.

B. Vapor Retarder (Non-Fire Rated):

1. Class A rated.
2. Water vapor permeance: 0.03 maximum.
3. Tensile strength: 45.0 LBF/IN.
4. Puncture resistance: Minimum 2200 grams.

C. Roof Insulation:

1. Rigid polyisocyanurate foam board.
   a. ASTM C1289, Class I, Type II.
   b. Compressive strength: 20 psi minimum.
   c. Density: 2 pcf minimum.
   d. Thermal resistance (R-Value): 7.2/IN.
   e. Water vapor transmission: ASTM E96, less than 1.0 perms.
   f. Water absorption: ASTM C209, less than 1.0 percent.
   g. Thickness noted on Drawings.
   h. Acceptable to roof manufacturer.

D. Roof Penetration Flashing:

1. Round penetrations:
   a. Premolded EPDM boot with metal collar.
   b. Buildex "DEK-TITE.".

E. Flashing Curb:

1. Provided by metal roofing manufacturer.
2. One-piece completely seal welded prefabricated roof curb, including vertical flashing, and counter flashing, cricket on high side of penetration and flat pan fabricated to replace standing seam metal roof panel.
3. Size as required for penetration.
4. Bottom sloped to match roof.
   a. Level on top.

5. Minimum 16 GA galvanized metal finished to match roof panel.

F. Foam and metal closures, calking, gaskets, fasteners, washers, clips, angles, and all miscellaneous trims shall be provided by roofing manufacturer, fabricated for the specific condition as required.

2.4 FABRICATION

A. General:

1. Fabricate with square, true corners, mitered and welded.
2. Fabricate trim, flashings and closure pieces to match panel profile and finish.
3. Hem all edges.
4. Fabricate panels in full length with no end laps.
   a. Any roll-forming of panels at the jobsite must be performed with industrial type rolling mill having at least 10 stands to gradually shape the sheet metal, maintaining flatness and strict tolerances.

B. Standing Seam Metal Roof Panels:

1. Profile: Centria "SRS" System.
2. Height of standing seam: 2 IN.
3. Gage: Minimum 24.
4. Width: 16 IN.
   a. Longitudinal stiffening elements to minimize oil canning.
5. System shall be designed as a true structural standing seam shape.
6. Finish:
   a. PVDF based with minimum 70 percent resin.
   b. Three-coat system having minimum 0.8 mil epoxy primer coat on both sides of panel with a 0.8 mil PVDF resin color coat and a 0.8 mil PVDF resin clear top coat on the exterior side of the panel.
   c. Meet or exceed requirements of AAMA 621.
   d. Smooth finish.
   e. Centria "DURAGARD PLUS."
   f. Color:
      1) To be selected from manufacturers full range of colors.
         a) Does not include Centria "SUNDANCE" Series colors.
7. Concealed fasteners:
   a. Provide concealed fasteners in all locations.

b. If exposed fasteners are required by the roof panel manufacturer, because of location, constructability issues or other critical design requirement, finish of fastener shall match roof panel finish.

1) Exposed fasteners are to be approved by Owner's Representative.

c. The use of deflection limiter devices is not allowed.

C. Intermediate Support System:

1. Roof panel anchor clips:

a. Manufacturer's standard one-piece clip suitable for condition.

1) Two-piece clips are acceptable if required by roofing manufacturer.

b. Minimum 16 GA.

c. ASTM A653, hot-dipped galvanized, with minimum 2.0 OZ zinc/SF coating.

2. Roof panel manufacturer shall be responsible for designing and providing all necessary intermediate "Z" or "hat-shaped" or other miscellaneous support members as required to transfer roof panel loads into building roof framing members.

a. Design in accordance with Building Code and loads specified.

3. Bearing plates:

a. Galvanized steel sized by roofing manufacturer for roof loading indicated.

b. Minimum 16 GA.

c. ASTM A653, hot-dipped galvanized, with minimum 2.0 OZ zinc/SF coating.

2.5 SOURCE QUALITY CONTROL

A. Structural Testing:

1. Structural-uniform uplift load capacity of the panel system shall be determined in accordance with ASTM E1592.

a. The factor of safety on the test results shall be 1.65 for the panel, batten or clip ultimate loads with no increase for wind.

b. The factor of safety for fasteners shall be 3.0 for one (1) single fastener per clip, 2.25 for two (2) fasteners per clip and 4.0 in masonry.

c. Design uplift capacity for conditions of gage, span or loading other than those tested may be determined by interpolation of test results.

1) Extrapolation of conditions outside the range of the tests is not acceptable.

d. Deflection shall be L/180 for positive loading.

B. Water Penetration: No uncontrollable leakage at minimum 6.4 psf when tested in accordance with ASTM E1646.

C. Air Infiltration: Maximum 0.00 scfm/SF when tested at 4.0 psf differential pressure when tested in accordance with ASTM E1680.

D. The panel system shall have a UL 580, Class 90 20 rating. The panels shall withstand a 250 LB concentrated load applied to a 4 SQ IN area at the center of the panel at mid span between supports with no panel deformation, rib buckling, or panel sidelap separation which will adversely affect the weather tightness of the system.

E. Support roofing panels on top of roof insulation using bearing plates attached to the structural frame or connect to manufacturer-provided intermediate support system.

1. Bearing plate and standing seam roof panel anchor clip attachment is to be determined by the roofing manufacturer and shall take precedent over this Specification.

a. Provide attachment to roof structural frame or deck as required for loading criteria specified.

2. Roof panel anchor clips shall be designed to allow thermal movement of the panels except where specific fixed points are indicated.

a. Roof panel manufacturer shall be responsible for determining fixed point locations unless otherwise indicated.

b. Wood blocking shown at roof edge is strictly for attachment of miscellaneous flashings and shall not be used for any structural value.

3. Maximum spacing of roof clips shall be determined by manufacturer.

F. Roof panel manufacturer shall be responsible for designing and installing all necessary expansion joints in the roof system.

2.6 MAINTENANCE MATERIALS

A. Provide Owner with 4 OZ of touch-up paint to match each different color used in the system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide all closures, trim, angles, plates, calking, gaskets, fasteners, washers, etc., as required for a complete water and air tight installation.

B. Install all soffit panels in accordance with manufacturer's recommendations using concealed fasteners when possible.

1. Exposed fasteners to be painted to match soffit finish.

C. Install products in accordance with manufacturer's instructions, SMACNA (where referenced) and details shown on Drawings.

D. Attachments shall allow for thermal expansion and contraction.

E. Seal all joints as required for watertight installation.

F. Install panels in one (1) continuous length from ridge to eave.

G. Touch-up paint all damaged surfaces.

H. Install vapor retarder in accordance with manufacturer's recommendations.

1. Repair all tears and tape all joints with tape recommended by vapor retarder manufacturer.
2. Lap joints minimum 4 IN.

I. Install roof underlayment per manufacturer's recommendations in areas indicated on Drawings.

1. Provide underlayment from eave line to a point that is a minimum of 36 IN horizontally inside the interior face of the exterior wall.
2. Provide at all ridges, hip ridges and hip valley lines extending minimum 36 IN up the slope at valleys and down the roof slope each side of the ridge line.

J. Gutters:

1. Install gutters using gutter straps in accordance with SMACNA Table 1-8 and Figure 1-12 and per roofing manufacturer's recommendations.
   a. Provide gutter brackets or hangers at 24 IN OC maximum.
   b. Provide expansion joints in gutters per SMACNA and at expansion joint locations shown on Drawings.
   c. Install gutters to provide positive drainage to downspout locations.
   d. Seal all joints in gutters to provide completely water tight system.

K. Downspouts:

1. Install downspouts in locations shown on the Drawings.
2. Provide downspout anchor straps per SMACNA Figure 1-35 as appropriate for downspout style.
3. Provide gutter to downspout connection per SMACNA Figure 1-33B, Detail 1.
4. Seal all joints in downspout for a complete watertight system.
5. Angle bottom of downspout out away from building
6. Anchor hanger straps to building wall with stainless steel screws and anchor sleeves appropriate for wall construction.
7. Provide minimum of two (2) anchors per strap.

8. Maximum spacing of hanger straps shall be 10 FT with minimum of two (2) hanger straps per vertical piece of downspout.
9. Spacing and location of hanger straps shall be consistent from downspout to downspout.

L. Install sheathing to meet wind uplift rating requirements specified.

3.2. FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

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

3.3 OWNER TRAINING (NOT USED)

END OF SECTION

SECTION 07 62 00

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Architectural flashing and sheet metal work.
2. Prefinished gutters and downspouts.
3. Specification Section is applicable to:
    a. Metal counter flashing.
    b. Roof penetration sleeves and hood flashing
    c. Metal wall flashing.
    d. Metal expansion joints.
    e. Gutters and downspouts and support brackets; splash blocks and pans (rain drainage).
    f. Exposed metal trim/fascia units and gravel stops.
    g. Miscellaneous sheet metal accessories, vents.
    h. Flexible flashing.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 04 05 23 – Masonry Accessories.
4. Section 07 90 00 – Joint Protection.
5. Section 09 91 00 – Painting and Protective Coatings.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
    a. B32 – Standard Specification for Solder Metal.
2. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
    a. Architectural Sheet Metal Manual, Sixth Edition, 2003.

B. Qualifications:

1. Sheet metal fabricator shall have minimum 10 years experience in fabrication of sheet metal items similar to items specified.
2. Sheet metal installer shall have minimum five (5) years experience installing sheet metal items specified.

1.4 DEFINITIONS

A. Installer or Applicator:

1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
2. Installer and applicator are synonymous.

1.5 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
3. Fabrication and/or layout drawings.
   a. Scaled drawing showing expansion joint locations, special conditions, profile, fastening and jointing details.
      1) Minimum plan scale: 1/8 IN = 1 FT.
      2) Minimum detail scale: 1-1/2 IN = 1 FT.
4. Fabricator qualifications.
5. Installer qualifications.

B. Samples:

1. Finish and color samples for each product specified for Owner’s representative preliminary color selection.
2. For final color selection, provide two (2) 2 IN x 3 IN colored metal samples for each color selected during the preliminary color selection.

C. Miscellaneous Submittals:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Warranty: Manufacturer's sample warranty language.

1.6 WARRANTY

A. Furnish five (5) year warranty on sheet metal work, signed jointly by Contractor and sheet metal installer commencing from date of Substantial Completion.

1. Agree to repair or replace work which leaks water or, where applicable, air or deteriorates excessively, including color failure, or otherwise fails to perform as watertight and, where appropriate, airtight flashing.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MATERIALS

A. Fasteners: Non-ferrous compatible with sheet metal.

B. Retainer Clips and Continuous Cleats: Galvanized steel or stainless steel.

C. Solder: ASTM B32.

D. Dissimilar Metal Protection: Comply with Specification Section 09 91 00 – Painting and Protective Coatings.

E. Reglets: See Specification Section 04 05 23 – Masonry Accessories.

2.3 ACCESSORIES

A. Accessories as required to form a complete water and airtight system.

2.4 FABRICATION

A. Sheet Metal (Steel):

1. Minimum 24 GA galvanized steel; G60 coating.
2. Match gage of surrounding sheet metal.

B. Retainer Clips and Continuous Cleats:

1. Use 16 GA galvanized steel, G60 coating minimum with ferrous steel flashing, coping and counter flashing and standing seam metal roofing wall trim.
2. Use 0.050 IN stainless steel with aluminum or stainless steel.

C. Reglets: See Specification Section 04 05 23 – Masonry Accessories.

D. Shop fabricate items to maximum extent possible.

1. Fabricate true and sharp to profiles and sizes indicated on Drawings.
   a. Shop fabricate and weld or solder all corners.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide items to be built into other construction to Contractor in time to allow their installation.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions, SMACNA, and as indicated on Drawings.

B. Solder steel and weld aluminum to achieve weather tight joints and required details; do not solder or weld slip joints and prefinished items.

C. Set top edges of membrane flashing and sheet metal flashing into reglets.

D. Fasten materials at intervals recommended by SMACNA.

E. Install slip joints to allow for thermal movement as recommended by SMACNA and manufacturer.

1. Maximum spacing: 10 FT OC.
2. Provide slip joint 24 IN from corners.
3. Provide slip joint at each vertical expansion joint location in wall.
    a. Provide break in continuous cleat at each vertical expansion joint.
    b. The above expansion joints do not include brick veneer expansion joints.

F. Caulk slip joints with two (2) beads of sealant on each side of slip joint overlap.

1. Refer to Specification Section 07 92 00 – Joint Sealants for sealant.

G. Caulk all exposed joints of coping with sealant to match color of metal being sealed.

H. Form flashings to provide spring action with exposed edges hemmed or folded to create tight junctures.

I. Provide dissimilar metals and materials protection where dissimilar metals come in contact or where sheet metal contacts mortar, concrete masonry or concrete.

1. Refer to Specification Section 09 91 00 – Painting and Protective Coatings for dissimilar metals protection.

J. Provide all components necessary to create watertight junctures between roofing and sheet metal work.

K. Provide all miscellaneous sheet metal items not specifically covered elsewhere, as indicated or required to provide a weather tight installation.

3.3 OWNERS TRAINING (NOT USED)

END OF SECTION

SECTION 07 90 00

JOINT PROTECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.

1.02 SUMMARY

A. Scope includes sealing of all joints and points of contact between different materials in exterior envelope of building, leaving no gaps in exterior of building that allows penetration by moisture, insect or bats. Extent of each form and type of joint sealer is indicated below and supplemental information shall be found on the drawings.

B. Section includes sealers for the following exterior joints in vertical surfaces and non-traffic horizontal surfaces as indicated below:

1. Control and expansion joints in unit masonry.
2. Joints between different materials listed above.
3. Perimeter joints between materials listed above and frames of doors and windows.
4. Control and expansion joints in ceiling and overhead surfaces.
5. Control and expansion joints in tilt-wall concrete panels (if tilt wall system is used)
6. Other joints as indicated.

C. Section includes sealers for exterior joints in horizontal traffic surfaces as indicated below:

1. Control, expansion, and isolation joints in cast-in-place concrete slabs for floors and paving.
2. Joints between different materials listed above.
3. Other joints as indicated.

D. Section includes sealers for interior joints in vertical surfaces and horizontal non-traffic surfaces as indicated below:

1. Control and expansion joints on exposed interior surfaces of exterior walls.
2. Perimeter joints of exterior openings.

3. Joints between tops of non-load-bearing unit masonry walls and underside of structural deck and beams.
4. Tile control and expansion joints.
5. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
6. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
7. Perimeter joints of toilet fixtures.
8. Other joints as indicated.

E. Sealing joints and penetrations for firestopping is specified in Division 7, Section 07 84 00 - "Firestopping" for through-penetration firestopping systems.

F. Sealing joints related to flashing and sheet metal for roofing is specified in Division 7, Section 07 62 00 - “Sheet Metal Flashing, Trim, and Accessories".

G. Sealants for glazing purposes are specified in Division 8, Section 08 80 00 and 08 88 13 - "Glass and Glazing."

H. Sealing tile joints is specified in Division 9, Section 09 30 00 - "Tiling."

1.04 REFERENCE STANDARDS

A. All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the following:

1. Adhesives, Sealants and Sealant Primers: Current South Coast Air Quality Management District (SCAQMD) Rule #1168.

2. Aerosol Adhesive shall comply with Green Seal Standard for Commercial Adhesives GS-36 requirements.

1.03 SYSTEM PERFORMANCE

A. Provide joints sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.04 SUBMITTALS

A. Product Data from manufacturer's for each joint sealer product required, including instructions for joint preparation and joint sealer application.

B. Samples for Initial Selection Purposes: Manufacturer's standard bead samples consisting of exposed to view strips of actual products showing full

range of colors available, for each product exposed to view.

C. Samples for verification purposes of each type and color of joint sealer required. Install joint sealer samples in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealers.

D. Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use indicated.

E. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project name, addresses, names of Architects and Owners, plus other information specified.

F. Product test reports for each type of joint sealers indicated, evidencing compliance with requirements specified.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer who has successfully completed, within the last 3 years, at least 3 joint sealer applications similar in type and size to that of this Project.

B. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

C. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of the Division-1 section covering this activity.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi-component materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.07 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg F.

2. When joint substrates are wet due to rain, frost, condensation or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.08 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

1.09 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

C. Warranty Period: Two years from date of Substantial Completion.

D. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

E. Warranty Period: 5 years from date of Substantial Completion.

F. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant

elongation and compression caused by structural settlement or errors attributable to design or construction.

2. Disintegration of joint substrates from natural causes exceeding design specifications.

3. Mechanical damage caused by individuals, tools, or other outside agents.

4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors: Provide a color of exposed joint sealer as selected by Architect from manufacturer's standard colors.

2.02 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class and Uses.

B. One-Part Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide; intended for sealing interior joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.

1. Application: Interior vertical and non-traffic horizontal joints in wet areas (e.g. showers, kitchens, perimeter joints of toilet fixtures).

2. Available Products:

a. "Dow-Corning 786"; Dow Corning Corp. www.dowcorning.com
b. "SCS 1700 Sanitary"; General Electric Co. www.gesealants.com
c. "860 White"; Pecora Corp. www.pecora.com
d. "Rhodorsil 6B White"; Bluestar Silicones,

www.bluestarsilicones.com
e. "Tremsil 200"; Tremco, Inc. www.tremcosealants.com
f. "OmniPlus"; Sonneborn Building Products Div. of Chemrex, Inc. www.chemrex.com

C. One-Part Nonsag Urethane Sealant for Use NT: Type S; Grade NS; Class 25; and Uses NT,M, A, and, as applicable to joint substrates indicated, O;

1. Application: Exterior joints in vertical surfaces and non-traffic horizontal surfaces as indicated below:

a. Control and expansion joints in cast-in-place concrete.
b. Control and expansion Joints in unit masonry.
c. Joints between different materials listed above.
d. Perimeter joints between materials listed above and frames of doors and windows.
e. Control and expansion joints in ceiling and overhead surfaces.
f. Other joints as indicated.
g. Control and expansion joints in tilt-up concrete

2. Available Products:

a. "Chem-Calk 900"; Bostik Construction Products Div. www.bostik.com
b. "Vulkem 116"; Tremco, Inc. www.tremcosealants.com
c. "Dynatrol I-XL"; Pecora Corp. www.pecora.com
d. "Sikaflex-1a"; Sika Corp. www.sika.com
e. "Sikaflex-15LM"; Sika Corp. www.sika.com
f. "Sonolastic NP 1"; Sonneborn Building Products Div. of Chemrex, Inc. www.chemrex.com
g. "Dymonic"; Tremco, Inc. www.tremcosealants.com

D. One-Part Nonsag Urethane Sealant for Use T: Type S; Grade NS; Class 25, and complying with the following requirements for Uses:

1. Uses T, NT, A, and, as applicable to joint substrates indicated, O.

2. Application: Exterior horizontal joints subject to vehicular and pedestrian traffic. Interior horizontal joints subject to vehicular and pedestrian traffic and not indicated to receive expansion control assemblies.

3. Available Products:

a. "Chem-Calk 900"; Bostik Construction Products Div. www.bostik.com

b. "Sikaflex-1a"; Sika Corp. www.sika.com
c. "Sikaflex-15LM";Sika Corp. www.sika.com
d. "NP 1", Sonneborn Building Products Div., Chemrex Inc. www.chemrex.com
e. "Vulkem 116"; Tremco, Inc. www.tremcosealants.com

E. Single Part Pourable Urethane Sealant for Use T (at exterior paving): Type S; Grade P; Class 25, and complying with the following requirements for Uses:

1. Uses T, A, and, as applicable to joint substrates indicated, O.

2. Application: Exterior horizontal joints subject to vehicular and pedestrian traffic.

3. Available Products:

a. "Vulkem 45, Vulkem 45SSL"; Tremco, Inc. www.tremcosealants.com
b. "NR-201 Urexpan"; Pecora Corp. www.pecora.com
c. "SL 2"; Sonneborn Building Products Div., Chemrex Inc. www.chemrex.com

2.03 LATEX JOINT SEALANTS

A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, acrylic, mildew-resistant, acrylic-emulsion sealant complying with ASTM C 834, formulated to be painted and recommended for exposed applications on interior and on protected exterior locations involving joint movement of not more than plus or minus 5 percent.

1. Application: Interior joints in vertical surfaces and horizontal non-traffic surfaces as indicated below:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings.
c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
e. Other joints as indicated.

2. Available Products:

a. "Chem-Calk 600"; Bostik Construction Products Div, www.bostik.com

b. "AC-20"; Pecora Corp. www.pecora.com
c. "Sonolac"; Sonneborne Building Products Div.Sonneborn Building Products Div., Chemrex Inc. www.chemrex.com
d. "Tremflex 834"; Tremco Inc. www.tremcosealants.com

2.04 MISCELLANEOUS JOINT SEALANTS

A. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

1. Available Products:

a. "BA-98"; Pecora Corp. www.pecora.com
b. "Tremco Acoustical Sealant"; Tremco Inc. www.tremcosealants.com
c. “Sheetrock Brand Acoustical Sealant”, USG Corp. www.usg.com

2.05 COMPRESSION SEALS

A. Preformed Foam Sealant: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellant agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:

1. Properties: Permanently elastic, mildew-resistant, non-migratory, non-staining, compatible with joint substrates and other joint sealers.

a. Impregnating Agent; Manufacturer's standard.
b. Density: Manufacturer's standard.

2. Backing: Where required, provide backings suitable for intended use, compatible with joint substrates and other joint sealers, designed to work in conjunction with primary sealants in dual- sealant systems.

3. Available Products:

a. "Emseal"; Emseal Corp. www.emseal.com
b. "Emseal Greyflex"; Emseal Corp. www.emseal.com
c. "Polytite R"; Polytite Manufacturing Co., Inc. www.polytite.com
d. "Polytite Standard"; Polytite Manufacturing Co., Inc. www.polytite.com

e. 'Will-Seal 150"; Will-Seal Construction Foams Div.
f. "Will-Seal 250"; Will-Seal Construction Foams Div.
g. "York-Seal 100"; York Manufacturing, Inc. www.yorkflashings.com
h. "York-Seal 200"; York Manufacturing, Inc. www.Vorkflashings.com

B. Preformed Hollow Neoprene Gasket: Manufacturer's standard preformed polychlorophene elastomeric joint seal of the open-cell compression type complying with ASTM D 2628 and with requirements indicated for size, profile and cross-sectional design.

1. Available Manufacturers:

a. Watson-Bowman & Acme Corp. www.watsonbowman.com
b. The D.S. Brown Co. www.dsbrown.com

2.06 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of flexible, non-gassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Install only closed-cell or dual-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer, for cold-applied sealants only.

C. Elastomeric Tubing Joint-Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F (-15 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.07 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturer of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

2.08 JOINT FILLERS FOR EXTERIOR CONCRETE PAVING

A. General: Provide joint fillers of thickness and widths indicated.

1. Bituminous Fiber Joint Filler: Preformed strips of composition below, complying with ASTM D 1751:

a. Asphalt saturated fiberboard - “Fiber Board”, APS Cork Co. or approved equal.

PART 3 - EXECUTION

3.01 EXAIMINATION

A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1 Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; water; surface dirt and frost.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form release agents from concrete.

4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

D. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated.

E. Installation of Sealant Backings: Install sealant backings to comply with the

following requirements:

1. Install joint-fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

2. Do not leave gaps between ends of joint-fillers.

3. Do not stretch, twist, puncture or tear joint fillers.

4. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

5. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

F. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

G. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

H. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

2. Provide flush joint configuration per Figure 6B in ASTM C 962, where indicated.

3. Use masking tape to protect adjacent surfaces of recessed tooled joints.

4. Provide Recessed joint configuration per Figure 6C in ASTM C 962, of recess depth and at locations indicated.

I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrappings, taking care not to pull or stretch material, and complying with sealant manufacturer's directions for installation methods, materials and tools which produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

J. Installation of Preformed Hollow Neoprene Gaskets: Install gaskets, with minimum number of end joints, in joint recesses with edges free of spalls and sides straight and parallel, both within tolerances specified by gasket manufacturer. Apply manufacturer's recommended adhesive to joint substrates immediately prior to installing gaskets. For straight sections provide gaskets in continuous lengths; where changes in direction occur, adhesively splice gaskets together to provide watertight joint. Recess gasket below adjoining joint surfaces by 1/8 inch to 1/4 inch.

3.04 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.05 PROTECTION

A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION 07 90 00

SECTION 08 11 00

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal doors and frames.
2. Grouting of door frames.
3. Specification Section is applicable to new exterior doors

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 04 05 13 – Cement and Lime Mortars.
4. Section 08 70 00 – Finish Hardware.
5. Section 09 91 00 – Painting and Protective Coatings.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. National Association of Architectural Metal Manufacturers (NAAMM):
   a. Hollow Metal Manufacturers Association (HMMA).
3. Steel Door Institute (SDI):
   a. 117 – Manufacturing Tolerances Standard Doors and Frames.
   b. All SDI publications.
4. Steel Door Institute/American National Standards Institute (SDI/ANSI):
   a. A250.6 – Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
   b. A250.7 – Nomenclature for Standard Steel Doors and Steel Frames.

c. A250.8 (formerly SDI 100) – Recommended Specifications for Standard Steel Doors and Frames.

d. A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

e. A250.11 – Recommended Erection Instructions for Steel Frames.

5. Building code:
   a. International Code Council (ICC):
      1) International Building Code and associated standards, 2009 Edition including all amendments, referred to herein as Building Code.

B. Qualifications: Manufacturer must be current member of SDI, and NAAMM (HMMA).

C. Wipe coat galvanized steel is not acceptable as substitute for galvanizing finish specified.

1.4 DEFINITIONS

A. As identified in SDI/ANSI A250.7.

1.5 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
3. Schedule of doors and frames using same reference numbers as used on Drawings.
4. SDI certification.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store doors and frames in accordance with SDI/ANSI A250.11.

1.7 WARRANTY

A. Warrant doors in writing for life of installation against defects including:

1. Veneer delamination.
2. Bow or twist of 1/4 IN or more.
3. Telegraphing of any part of core through face veneer.
4. Surface variation exceeding 1/100 IN in 3 IN span.
5. Any other defect which may impair or affect performance of door for purpose for which it is intended.

B. Warranty to include:

1. Removal and replacement of defective door(s).
2. Removal of existing hardware and refitting to new door.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Metal doors and frames:
   a. CECO Corporation.
   b. Steelcraft Manufacturing Co.
   c. Curries Company.

B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MATERIALS

A. Sheet Steel: Hot-dipped galvannealed steel, ASTM A653, A60 coating.

B. Frames: Hot-dipped galvannealed steel, ASTM A653, A60 coating.

C. Supports and Reinforcing: Hot-dipped galvannealed steel, ASTM A653, A60 coating.

D. Inserts, Bolts and Fasteners: Manufacturer's standard.

E. Primer: Manufacturer's standard coating meeting SDI/ANSI A250.10.

F. Galvannealed Coating Repair: See Specification Section 09 91 00 – Painting and Protective Coatings.

G. Grout: As specified in Specification Section 04 05 13 – Cement and Lime Mortars.

H. Thermal Insulation: Polyurethane, CFC free.

I. Sound Insulation: Fiberglass batt insulation or impregnated Kraft honeycomb.

2.3 ACCESSORIES

A. Frame Anchors:

1. Jamb anchors:
   a. Masonry wire anchors: Minimum 0.1875 IN wire, galvanized.

b. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch (9.5-mm) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

c. Existing wall anchor: Minimum 18 GA, galvanized.

d. Stud partition and base anchors: Minimum 18 GA, galvanized.

2.4 FABRICATION

A. General:

1. SDI/ANSI A250.8.
2. Fabricate rigid, neat in appearance and free from defects.
3. Form to sizes and profiles indicated on Drawings.
   a. Beveled edge.
4. Fit and assemble in shop wherever practical.
5. Mark work that cannot be fully assembled in shop to assure proper assembly at site.
6. Continuously wire weld all joints, dress exposed joints smooth and flush.
7. Fabricate doors and frames to tolerance requirements of SDI 117.
8. Fit doors to SDI and NFPA 80 clearances.
9. All doors shall be handed.
10. Hinge cut-out depth and size on doors and frames shall match hinge specified in Specification Section 08 70 00 – Finish Hardware.
11. Design and fabricate doors to requirements of the Building Code.

B. Hollow Metal Doors:

1. General:
   a. 1-3/4 IN thick.
   b. Fabricate with flush top caps.
      1) Thickness and material to match door face.
      2) On exterior doors, seal weld top cap to door face and grind smooth and flush.
      3) On interior doors, attach top cap to door with concealed fasteners or by welding.
         a) Factory seal if attached with fasteners.
         b) No exposed fasteners will be accepted.
   c. Continuously wire weld all joints and dress, smooth and flush.
   d. Galvannealed per ASTM A653, A60 coating.

2. Exterior:
   a. Doors 36 IN wide, or less: SDI/ANSI A250.8, Level 3, and physical performance level A, Model 2.
      1) Face sheet minimum thickness: 16 GA.
      2) Insulated: Minimum R10.
   b. Comply with NFPA 80.
3. Interior:
   a. Doors 36 IN wide, or less: SDI/ANSI A250.8, Level 2, and physical performance level "B", Model 2.
      1) Face sheet minimum thickness: 18 GA.
   b. Sound insulated, minimum STC-35.

C. Hollow Metal Frames:
1. Door frames:
   a. Provide 2 IN face at all heads, jambs and mullions for frames in stud walls.
   b. Provide 4 IN face at head where noted on Drawings or required by wall construction.
   c. 26 GA galvannealed steel boxes welded to frame at back of all hardware cutouts.
   d. Steel plate reinforcement welded to frame for hinge, strikes, closers and surface-mounted hardware reinforcing.
      1) All plate reinforcement shall meet size and thickness requirements of SDI/ANSI A250.8.
      2) Galvannealed per ASTM A653, minimum A60.
   e. Split type frames not acceptable.
      1) All horizontal and vertical mullions and transom bars shall be welded to adjacent members.
   f. Conceal all fasteners.
   g. Frames shall be set up, all face joints continuously wire welded and dressed smooth.
   h. Exterior (up to 4 FT wide): 16 GA steel galvannealed per ASTM A653, A60.
   i. Exterior (over 4 FT wide): 14 GA steel galvannealed per ASTM A653, A60.
   j. Interior: 16 GA steel galvannealed per ASTM A653, A60.
   k. Provide removable spreaders at bottom of frame.

D. Prepare for finish hardware in accordance with hardware schedule, templates provided by hardware supplier, and SDI/ANSI A250.6.

1. Locate finish hardware in accordance with SDI/ANSI A250.8.
2. See Specification Section 08 70 00 – Finish Hardware for hardware.
3. Prepare doors for swing direction indicated.
    a. Preparing doors for non-handed hinges is not acceptable.

E. After fabrication, clean off mill scale and foreign materials, repair damaged galvannealed surfaces, and treat and prime with rust inhibiting primer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install doors and frames in accordance with SDI/ANSI A250.11, the Building Code and manufacturer's instructions.

B. Where applicable, place frames prior to construction of enclosing walls and ceilings.

C. Plumb, align, and brace securely until permanently anchored.

D. After completion of walls, remove temporary braces and spreaders.

E. Use plastic plugs to keep silencer holes clear during construction.

F. Immediately after erection, sand smooth rusted or damaged areas of prime and galvannealed coating.

G. Touch-up prime and galvannealed coating in accordance with Specification Section 09 91 00 – Painting and Protective Coatings.

H. Where indicated to be painted leave finish smooth for finish painting.

I. Install three (3) silencers on strike jamb of single door frame and two (2) on head of double door frame.

J. Number and location of anchors shall be in accordance with frame manufacturer's recommendation with minimum of three (3) anchors per jamb.

K. Protect doors and frames during construction.

3.2 FIELD QUALITY CONTROL

A. Remove and replace defective units.

B. Repair damage to finish in accordance with AWI recommendations.

C. Remove and replace damaged doors that are not capable of being satisfactorily repaired.

1. Owner’s Representative to make final decision on acceptance of finish repair.

3.3 OWNER TRAINING

D. Provide owner training and demonstration on maintenance, adjustment and care and operation of doors and frames.

END OF SECTION

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SECTION 08 51 50

METAL WINDOW REHABILITATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal windows.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 07 14 00 – Fluid Applied Waterproofing.

1.2 INTENT OF DESIGN

A. This specification accomplishes removal and reinstallation of the window frames to correct the following items, which may be part of other work items or specifications:

1. To correct issues with waterproofing around the window frames that do not appear to have sufficient flashing around the rough opening.
2. To correct issues with the sill plate not having welded end-dams and resulting leakage around the corners of the window frames.
3. To correct issues with the sealants (or lack of) within the window frame assemblies resulting leakage around the window frames.

1.3 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.4 QUALITY ASSURANCE

A. Static water test on each sill to be witnessed by Owner's Representative shall consist of filling the sill with water while temporarily plugging the weep hole(s) to verify welds are water-tight.

1.5 DEFINITIONS

A. Installer or Applicator:

1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
2. Installer and applicator are synonymous.

1.6 SUBMITTALS (NOT USED)

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store units in vertical position off ground with wood spacers between each unit.

1.8 WARRANTY

A. Five (5) year warranty of weathertightness of installation from date of Substantial Completion.

1. Air and water integrity and structural adequacy of units and hardware, including sealants within and around perimeter of installation.
2. Signed jointly by installer and contractor.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS (NOT USED)

2.2 MATERIALS

A. Sealants: As specified in Specification Section 07 14 00 – Fluid Applied Waterproofing.

2.3 ACCESSORIES (NOT USED)

2.4 FABRICATION (NOT USED)

2.5 SOURCE QUALITY CONTROL (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Remove, install specified fluid-applied waterproofing to opening, and reinstall products in accordance with manufacturer's instructions.

B. Set units plumb, level, and true to line.

C. Anchor securely in place.

D. Set sill and base members in a bed of sealant.

E. Provide joint fillers and new gaskets for weathertight construction.

F. Apply sealant to all joints within and at perimeter of system.

G. Weld all end-dams on perimeter of system that are in need of repair to guarantee weathertight construction.

H. Provide sealant color to match finish of system at exposed locations.

I. Provide sealants compatible with metal system and recommended for use with this type of installation.

J. See Specification Section 07 14 00 – Fluid Applied Weatherproofing.

3.2 FIELD QUALITY CONTROL (NOT USED)

3.3 OWNER TRAINING (NOT USED)

END OF SECTION

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SECTION 08 70 00

FINISH HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Finish hardware.
2. Specification Section is applicable to new exterior doors as indicated on drawings

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 08 11 00 – Metal Doors and Frames.

1.2 MEASUREMENT AND PAYMENT

A. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. All door hardware shall be provided by the same hardware supplier.

1. Hardware required by doors specified in Specification Section 08 11 00 – Metal Doors and Frames, Specification Section 08 11 16 – Aluminum Doors and Frames, is to be provided under this Specification Section unless noted otherwise.

B. Referenced Standards:

1. Americans with Disabilities Act (ADA):
   a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
2. Texas Accessibility Standards (TAS)
3. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
   a. A156.1 – Butts and Hinges.
   b. A156.3 – Exit Devices.
   c. A156.4 – Door Controls (Closers).
   d. A156.6 – Architectural Door Trim.
   e. A156.8 – Door Controls - Overhead Holders.
   f. A156.13 – Mortise Locks and Latches.

g. A156.16 – Auxiliary Hardware.

h. A156.18 – Materials and Finishes.

i. A156.21 – Thresholds.

4. National Fire Protection Association (NFPA):

a. 80 – Standard for Fire Doors and Other Opening Protectives.

5. Steel Door Institute (SDI).

6. Underwriters Laboratories, Inc. (UL):

a. Building Materials Directory.

7. Building code:

a. International Code Council (ICC):

1) International Building Code and associated standards, 2009 Edition including all amendments, referred to herein as Building Code.

C. Qualifications:

1. Installation shall be performed or inspected by Certified Architectural Hardware Consultant (AHC).

1.4 DEFINITIONS

A. AHC: Certified Architectural Hardware Consultant.

B. Installer or Applicator:

1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.

2. Installer and applicator are synonymous.

C. All weather: Capable of operation from -50 to +120 DegF.

D. Active Leaf: Right-hand leaf when facing door from keyed side unless noted otherwise on Drawings.

E. FRP: Fiberglass reinforced plastic.

1.5 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

b. Manufacturer's installation instructions.

3. Schedule of all hardware being used on each door.
    a. Number hardware sets and door references same as those indicated on Drawings.
4. Technical data sheets on each hardware item proposed for use.
5. Wiring Diagrams: For power, signal, and control wiring and including the following:
    a. Details of interface of electrified door hardware and building safety and security systems.
    b. Schematic diagram of systems that interface with electrified door hardware.
    c. Point-to-point wiring.
    d. Risers.
    e. Elevations doors controlled by electrified door hardware.
6. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
7. Warranty information for all hardware devices having extended warranties.

B. Miscellaneous Submittals:
1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Certified Architectural Hardware Consultant qualifications.
3. Letter from Certified Architectural Hardware Consultant stating all door hardware has been provided per approved Shop Drawings, has been inspected, has been installed in accordance with manufacturer's recommended installation instructions and is in proper working order.

1.6 WARRANTY

A. Provide all individual manufacturer's extended warranties as advertised.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Locksets and latchsets:
    a. Corbin/Russwin.
    b. Best Access Systems.
    c. Sargent

d. Schlage

2. Closers:
   a. LCN.
   b. Norton.
   c. Corbin/Russwin.
3. Hinges:
   a. Stanley Works.
   b. Hager Hinge Co.
   c. McKinney Manufacturing Co.
4. Door stops and holders:
   a. Trimco.
   b. Rockwood.
   c. Ives.
5. Overhead stops:
   a. Glynn-Johnson Corp.
   b. Rockwood.
   c. Trimco
   d. Rixson.
6. Weatherstripping and thresholds:
   a. Pemko Manufacturing Co.
   b. Reese Enterprises, Inc.
   c. Zero Weatherstripping, Inc.
   d. National Guard Products, Inc.
7. Exit devices: (Provide electric latch retraction where indicated):
   a. Von Duprin, Inc.
   b. Corbin/Russwin.
   c. Precision.
   d. Sargent.
8. Door bolts, coordinators and strikes:
   a. Ives.
   b. Trimco.
   c. Hager.
   d. Rockwood.

e. Dorma.

9. Door and Frame Transfer Devices: Steel housing for mortise in hinge stile of door, with flexible tube for wiring bundle; accommodating doors that swing open to 120 degrees.

10. Other materials: As noted.

B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MATERIALS

A. Fasteners: Stainless steel or aluminum.

B. Locking, Latching and Retracting Mechanism and Lock Case:

1. Manufacturer's standard.

C. Closers:

1. Shell: Aluminum or cast iron.

2. Arms and piston: Forged steel.

D. Kickplates:

1. Stainless steel.

2. FRP.

E. Thresholds: Aluminum.

F. Overhead Stops and Wall Stops: Stainless steel or aluminum.

G. Keys: Brass or bronze.

H. Weatherstripping and Smoke Seals: Polypropylene, neoprene, or EPDM.

I. Pulls and Push Plates: Stainless steel.

2.3 ACCESSORIES

A. Closer Mechanism Covers:

1. Match finish of adjacent hardware.

2. Full cover.

3. Manufacturer's standard plastic cover.

B. Arms, Brackets, and Plates: As required for complete installation of closers.

C. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; listed and labeled for use with fire alarm systems.

D. Strikes:

1. Stainless steel, 630 finish.

2. Provide with curved lips.

3. Extended lips when required.
4. Furnish strike boxes.
5. Appropriate for function and hardware listed.

2.4 FABRICATION

A. Hardware - General:

1. Generally prepare for Phillips head machine screw installation.
2. Exposed screws to match hardware finish or, if exposed in surfaces of other work, to match finish of other work as closely as possible.
3. For mineral core doors use screws which thread to head to apply butts.
4. Provide concealed fasteners unless thru bolted.
5. Through bolt closers on all doors.
6. Furnish items of hardware for proper door swing.
7. Furnish lock devices which allow door to be opened from inside room without a key or any special knowledge.

B. Hardware:

1. Fabricate hardware for fire rated openings in compliance with UL and NFPA 80.
   a. This requirement takes precedence over other requirements for such hardware.
   b. Provide only hardware which has been tested and listed by UL for types and sizes of doors.
   c.
2. Provide stainless steel dustproof strikes for all doors with automatic or manual flush bolts or other bolts into floor.
3. Provide following ANSI/BHMA A156.18 finishes:
   a. Locks: 630.
   b. Door pulls, push bars, push plates: 630.
   c. Kickplates:
      1) 630 (if metal kickplates are specified).
      2) FRP on FRP doors.
   d. Exit devices: 630 or 626.
   e. Butts: 630.
   f. Door stops, dead locks, mortise bolts, and miscellaneous hardware: 630 if available, 626 if 630 not available.
   g. Door overhead stops: 630.

h. All parts of closers (other than corrosion resistant closers): Provide special rust inhibiting pretreatment.

C. Mortise Locks and Latches:

1. ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 1.

a. Meet requirements of ADA.

2. Antifriction two-piece mechanical latchbolt with stainless steel anti-friction insert.

a. One-piece stainless steel deadbolt, minimum 1-1/4 IN x 9/ 16 IN thick with 1 IN throw.

b. 2-3/4 IN backset.

c. Cylinder: Brass, 6 pin, with interchangeable core.

d. ADA compliant thumb turn lever.

e. Corbin/Russwin:

1) Trim design "NSP" for all doors.

f. Functions as indicated in following table in accordance with ANSI/BHMA A156.13.

1) All electric lock hardware to be 24 Vdc.

MORTISE LOCK NUMBERS

ANSI	FUNCTION	CORBIN/RUSS WIN
F01	Passage	ML2010
F19	Privacy	ML2030
F05	Classroom	ML2055
F07	Storeroom	ML2057
F13	Entrance or Office	ML2065
	Electronic Lockset	ML20905 x M92

D. Door Closers:

1. ANSI/BHMA A156.4, Grade 1.

2. Size door closers to comply with ANSI recommendations for door size and location.

3. Fabricate all closers with integral back check.

a. Provide all weather fluid for all closers used in exterior doors .

4. Closers (other than corrosion resistant closers): LCN 4040 Series or Norton 7500 Series or Corbin-Russwin DC6200 Series.
5. Provide manufacturer's standard 10 year warranty.

E. Butts and Hinges:

1. ANSI/BHMA A156.1.
2. Hinge numbers:

	HAGER	STANLEY
Type 1 (Typical butts)	BB1199	FBB199

3. Flat button tips on all butts.
4. Butt types:
   a. Type 1: Provide NRP (non-removable pin) on all exterior doors and where noted in the Schedule.
   b. All other doors: Type 1.
5. Butt quantities:
   a. Doors 61-90 IN in height: Three (3) butts.
   b. Doors 91-114 IN in height: Four (4) butts.
   c. Doors 115-144 IN in height: Five (5) butts.
6. Butt sizes:
   a. 1.75 IN doors: 4.5 x 4.5 IN for all doors up to and including 46 IN wide.

F. Door Stops:

1. ANSI/BHMA A156.16.
   a. Wall stops: Ives WS406-CVX or WS406-CCV.

G. Overhead Door Holders/Stop:

1. ANSI/BHMA A156.8.
2. Surface mounted stops:
   a. Rockwood N14400 Series or Glynn Johnson 90 Series.
   b. US32D finish.
   c. Provide 'hold-open' function on all stops except fire rated doors.
3. Concealed stops:
   a. Rockwood N11000 Series or Glynn Johnson 100 Series.
   b. US32D finish.
   c. Provide 'hold-open' function on all stops except fire rated doors.

H. Kickplates:
   1. ANSI/BHMA A156.6.
   2. 8 IN high x 2 IN less than door width.
   3. Beveled on all edges.
   4. 0.050 IN thick for all doors except FRP.

I. Thresholds:
   1. ANSI/BHMA A156.21.
   2. One-piece unit:
      a. Maximum 1/2 IN high.
      b. 6 IN wide.
   3. Provide required bolt cutouts.

J. Exit Devices:
   1. ANSI/BHMA A156.3, Grade 1.
   2. Type and function as indicated in Hardware Schedule under PART 3on drawings.
   3. Von Duprin products listed.

K. Astragal: UL listed for labeled doors.

L. Weatherstripping: (Interior Doors):
   1. Weather seal at jambs and head: Self-adhesive strip Reese #797W.
   2. Sweep at bottom of doors: Reese {701C} {#701D}.
   3. Weather seal astragal at meeting edges of pairs of doors: Reese 92C each leaf. Weatherstripping (Exterior Doors):
   4. Fixed /Screwed

M. Keying:
   1. Establish keying with Owner.
      a. Provide and set up complete visible card indexed system with key tags and control slips.
      b. Tag and identify keys.
      c. Provide two (2) keys for each lock or cylinder.
      d. Master key and key in groups as directed.
      e. Provide construction master keys for all exterior doors.

N. Bolts:
   1. ANSI/BHMAA 156.16.
   2. Surface bolts: Ives SB1630 Series with top and bottom strikes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's installation instructions, supervised or inspected by an AHC.

B. Fit hardware before final door finishing.

C. Permanently install hardware after door finishing operations are complete.

D. Use SDI mounting heights for hardware.

E. Mount closers on push side of doors unless noted otherwise.

1. Provide extended arms and brackets as required.

2. Provide full cover for each closer.

3. Mount closers on pull side of the door for the following doors:

F. Install closers with integral stop at all doors scheduled to receive closer unless noted otherwise.

1. Do not install integral stop on closers mounted on pull side of door.

G. Provide appropriate overhead stop when corrosion resistant closer is specified.

H. Where interior doors swing more than 105 degrees without encountering a wall and which do not have a closer scheduled, provide overhead stop.

1. Provide concealed overhead stop on doors scheduled to receive closer mounted on pull side of door.

I. Provide hold-open feature when required by Hardware Schedule.

J. Provide coordinator when required by hardware specified.

K. Wall Mount Door Stops:

1. Provide at all doors unless noted to receive overhead stop, closer with integral stop or as noted otherwise on Hardware Schedule.

2. Floor mounted stops are not acceptable unless noted otherwise in this Specification Section.

L. Install overhead stop at all inactive leafs of pairs of doors unless provided with closer.

M. Install astragal on all pairs of UL labeled fire doors.

N. Provide weather seal, door sweep and threshold at all exterior doors and where scheduled on interior doors.

1. Set thresholds in a full bed of sealant.

2. Mount door sweeps on exterior face of door.

3. Mount weather seal astragal at meeting edges of pairs of doors on the exterior face of the doors.

O. Provide smoke seals on all fire rated doors.

P. Mount kickplates on push side of doors.

Q. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

R. Boxed Power Supplies: Locate power supplies as indicated.

3.2 FIELD QUALITY CONTROL

A. Adjust and check each operating item of hardware to assure proper operation or function.

1. Lubricate moving parts with lubricant recommended by manufacturer.

B. During week prior to startup, make a final check and adjustment of all hardware items.

1. Clean and lubricate as necessary to assure proper function and operation.

2. Adjust door control devices to compensate for operation of heating and ventilating equipment.

3.3 OWNER TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.4 SCHEDULES

A. See Drawings

END OF SECTION