PROJECT MANUAL

Volume II

ICI WAREHOUSE EXPANSION

Project # 32011091-2026-003

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PROJECT MANUAL

ICI Warehouse Expansion

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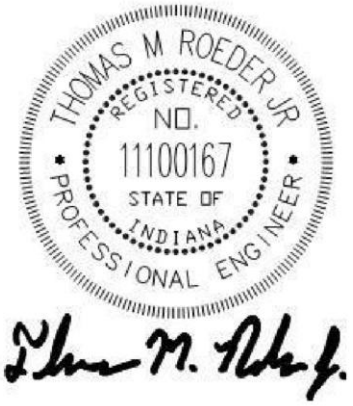

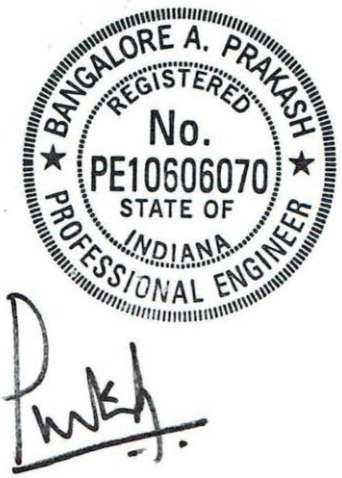

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SECTION 02 01 00 - MAINTENANCE OF EXISTING CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protection of existing buildings, facilities, utilities and site improvements to remain.
2. Verification of existing utilities, site improvements and site conditions.

B. Related Sections:

1. Division 00 Section "Geotechnical Data".
2. Division 02 Section "Selective Site Demolition".

1.2 SUBMITTALS

A. Shop Drawings: submit drawings showing details of any proposed construction which is necessary to protect existing construction and utilities.

B. Engineering Design:

1. If required by job conditions, Contractor shall retain the services of a licensed Professional Engineer registered in the state in which the project is located to design temporary and permanent installations as required to protect existing improvements and conditions.
2. All information required for the design shall be the Contractor's responsibility to obtain.
3. Submit design drawings and calculations to the Architect/Engineer for review. Review by the Architect/Engineer shall not relieve Contractor of full responsibility for design or work. The purpose of the Architect/Engineer review shall be only to protect the Owner from inadequate or insufficient protection for existing improvements and conditions. By reviewing the design, the Architect/Engineer assumes no responsibility for the design or adequacy thereof.
4. Underpinning calculations, if required, shall be reviewed by the Geotechnical Engineer.
5. All design drawings and calculations submitted shall be signed and sealed by the Contractor's Engineer.

1.3 PROJECT CONDITIONS

A. Existing Site Conditions:

1. The Drawings do not propose to show all existing improvements on the site.
2. Information shown on the Drawings was obtained from drawings of previous construction projects and/or a site survey provided by the Owner.

3. Recorded information concerning existing construction is available for examination in the Architect/Engineer office.
4. Existing structures:

    a. Bottom of existing footing elevations are unknown.
    b. Loads on existing footings and foundations are unknown.
    c. Dimensions of existing foundations are unknown.

5. Information regarding existing subsurface conditions is unconfirmed. See Division 00 Section "Geotechnical Data" for available information regarding Geotechnical Data and soils information.
6. Information concerning the approximate locations of known existing underground utilities is shown on the Drawings. Depths and locations of existing utilities are unconfirmed.
7. Utilities include all underground and above ground piping, conduits, cables and related structures and appurtenances. Utilities also include sewers.

B. Contractor is responsible for verifying all existing site conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Contractor may use materials and systems recognized as suitable for protection of existing improvements and conditions.
2. Untreated wood may only be used for temporary protection, bracing, supports, shores, etc.
3. The Owner or Architect/Engineer may prohibit certain materials and systems if they interfere with the Owner's operations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Pre-Bid Site Inspection:

1. Bidders shall examine the site, inspect existing buildings, review existing plans and become familiar with all conditions under which the contract work will be performed.
2. This shall be completed during the bidding phase in order that bids include all costs for protection of existing improvements and conditions.
3. Contractor shall notify the Architect/Engineer during the bidding phase of any discrepancies in bidding documents, existing conditions documents and field conditions.
4. No later claim for extra compensation will be allowed, unless it is determined by the Owner and Architect/Engineer to be unforeseen conditions.

B. Pre-Construction Verification of Existing Conditions:

1. Contractor shall verify all existing site conditions and improvements prior to construction, which include field verifying locations of existing utilities and all other existing above grade and below grade improvements which may affect proposed construction activities.
2. Contractor shall notify the Architect/Engineer immediately with conflicts or discrepancies from existing field conditions, existing conditions documentation and proposed new construction.
3. These verifications are to be done well in advance of construction activities in order to allow time for revising design if required.

3.2 GENERAL

A. Contractor shall have underground utilities marked prior to beginning any excavation or other underground work around proposed activity.

B. Provide all permanent and temporary construction necessary to protect existing improvements and conditions as required by construction activities.

C. Install all protection in a manner which will not interfere with the Owner's operations or adjacent work.

D. If at any time movement or other failure is observed in existing improvements or conditions, cease operations, provide all additional protection necessary to stabilize and retain said existing installations and notify Owner immediately.

3.3 JOB COMPLETION

A. Upon completion of construction activities, leave the site in a neat and orderly condition.

B. Restore all areas disrupted by construction activities, which were to remain and not be altered, to their original condition at no additional cost to Owner.

END OF SECTION

SECTION 02 41 13 - SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition of existing site improvements made obsolete by this project, as indicated or implied by the contract documents.
2. Removal of demolition items and debris from site.
3. Protection of items to remain.
4. Abandonment of items indicated in contract documents.
5. Removal, storage and protection of items to be salvaged.
6. The removal of asbestos or lead containing products is not included in this scope of work. If such materials are discovered during demolition, notify the Owner immediately.

B. Related Sections:

1. Division 31 Section “Site Clearing”.

1.2 REQUIREMENTS

A. General:

1. Proper access and function of existing facility operations must be maintained at all times.
2. Demolition activities shall not interfere with or interrupt the operations of the facility, employees or the public.
3. A complete and operable utility system must be maintained at all times.
4. Sufficient parking and site access must be maintained at all times.
5. The route for construction traffic and the removal of debris shall be limited to specific areas. See Drawings for further information.
6. Contractor is solely responsible for providing all permanent and temporary means to ensure site access, utility services and other required conditions are maintained at all times.

B. Miscellaneous:

1. On-site burning is not permitted.
2. Blasting or any other use of explosives is not permitted.
3. Use of heavy vibratory or other similar means that cause excessive nuisance to the public or compromise safety of existing facilities is not permitted.
4. Comply with NFPA 241 (latest edition).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete: If required, shall comply with Division 32 Section "Site Concrete".

B. Flowable Fill: If required, shall comply with Division 31 Section "Flowable Fill".

C. All other materials not specifically described but required for proper completion of the work shall be selected by the Contractor subject to approval of the Architect/Engineer and Owner.

PART 3 - EXECUTION

3.1 PREPARATION

A. Refer to Division 02 Section "Maintenance of Existing Conditions" for verification and maintenance of existing site conditions.

B. Coordination:

1. Contact Owner prior to site mobilization to discuss and verify site access and routing requirements. Prepare a schedule if requested by Owner.
2. Before commencing the work of this Section, verify with the Architect/Engineer and Owner all items to be removed, all items to remain and all items to be salvaged.

3.2 GENERAL

A. Protection:

1. Demolition shall be done in such a manner to protect adjacent materials.
2. Use all necessary and appropriate means to prevent the spread of dust during demolition.
3. Protect employees and public from dust, noise, light, vibration, odor and all other types of nuisances and hazards.
4. Protect all existing items to remain. If such items are damaged, they shall be repaired or replaced by the Contractor to the Owner's satisfaction at no additional cost to Owner.
5. Items to be demolished as indicated in contract documents or made obsolete by field conditions shall be removed and disposed of off the project site. Abandoning such items in place shall not be permitted unless specifically indicated in the contract documents or approved by Architect/Engineer and Owner.
6. Avoid overloading of existing structures by either a build-up of demolished items or by impact loading of demolished items on the existing structure.
7. Bracing and shoring and other similar and appropriate means shall be used where necessary to avoid collapse or other compromising of structures or materials.

B. Demolition:

1. Items indicated in contract documents to be demolished shall be removed, demounted or disconnected in the best possible manner to ensure that no damage will result to other adjacent items or surfaces to remain.
2. Abandoning demolished items in place is not permitted unless specifically indicated in the contract documents or approved by Architect/Engineer and Owner.
3. For items indicated or approved as being abandoned in place, the means of abandonment shall be reviewed and approved by the Architect/Engineer and Owner prior to abandonment.
4. Phase demolition as described in the contract documents, as required per field conditions and per Owner's request.

C. Salvage:

1. Protect items to be salvaged during removal, handling and storage.
2. All reusable items salvaged during demolition operations shall be retained for the Owner's inspection. Only items so inspected and rejected by the Owner shall be disposed. All other such items shall be turned over to the Owner.

D. Cleaning:

1. Areas in which demolition and salvage work are being done shall be cleaned daily.
2. All dirt, dust, debris, unsalvageable and non-reusable items and similar items shall be removed from the project site daily.
3. Under no circumstances shall such refuse be allowed to collect for longer periods.
4. Refuse shall not be allowed to block or otherwise impair circulation in corridors, stairs, sidewalks or other traffic areas at any time.

E. Disposal:

1. Except for items or materials indicated to be reused, salvaged, reinstalled or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them at an EPA-approved landfill.

3.3 JOB COMPLETION

A. At the completion of demolition activities, ensure all demolition debris is removed from site. Restore adjacent areas to original condition and repair any damaged items to Owner's satisfaction at no additional cost to Owner.

END OF SECTION

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Demolish and remove all items required to complete the work indicated.
2. Demolish designated building equipment and fixtures.
3. Demolish designated construction.
4. Cutting and alterations for completion of the Work.
5. Removing designated items for reuse or Owner's retention as indicated.
6. Protecting items designated to remain.
7. Removing demolished materials.
8. Cap and identify existing utilities.
9. Provide adequate shoring and bracing.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Demolition Schedule: Indicate overall schedule and interruptions required for utility and building services.

C. Shop Drawings:
1. Indicate demolition and removal sequence.
2. Indicate location of items designated for reuse or Owner's retention.
3. Indicate location and construction of temporary work.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution Requirements: Requirements for submittals.

B. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition and subsurface obstructions.

1.4 QUALITY ASSURANCE

A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.

B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.

C. Obtain required permits from authorities having jurisdiction.

1.5 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.6 SCHEDULING

A. Section 01 32 30 - Network Analysis Schedules: Requirements for scheduling.

B. Schedule Work to coincide with new construction.

C. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation and in adjoining spaces.

D. Perform noisy or dusty work as scheduled with the Owner.

E. Coordinate utility and building service interruptions with Owner.
1. Do not disable or disrupt building fire or life safety systems without three days prior written notice to Owner.
2. Schedule tie-ins to existing systems to minimize disruption.
3. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.7 PROJECT CONDITIONS

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

B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

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

B. Mark location and termination of utilities.

C. Erect, and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.

D. Layout cuts in post tensioned concrete elements to avoid cutting concrete within 12 inches (300 mm) of any stressing tendon. Notify Architect/Engineer three days in advance of cutting post-tensioned concrete.

E. Erect and maintain weatherproof closures for exterior openings.

F. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued Owner occupancy.

G. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure.

H. Provide appropriate temporary signage including signage for exit or building egress.

I. Do not close or obstruct building egress path.

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

3.2 SALVAGE REQUIREMENTS

A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.

B. Tag components and equipment Owner designates for salvage.

C. Protect designated salvage items from demolition operations until items can be removed.

D. Carefully remove building components and equipment indicated to be salvaged.

E. Disassemble as required to permit removal from building.

F. Package small and loose parts to avoid loss.

G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.

H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.

I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

3.3 DEMOLITION

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

B. Maintain protected egress from and access to adjacent existing buildings at all times.

C. Do not close or obstruct roadways or sidewalks without permits.

D. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer.

E. Disconnect and remove designated utilities within demolition areas.

F. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.

G. Demolish in orderly and careful manner. Protect existing improvements and supporting structural members.

H. Carefully remove building components indicated to be reused.
   1. Disassemble components as required to permit removal.
   2. Package small and loose parts to avoid loss.
   3. Mark components and packaged parts to permit reinstallation.
   4. Store components, protected from construction operations, until reinstalled.

I. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

J. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

K. Remove temporary Work.

END OF SECTION

SECTION 03 10 00 – CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish, install, and remove all formwork for all cast-in-place concrete as shown or implied on the Contract Documents.
2. Design of formwork, shoring and reshoring.

B. Related Sections:

1. Division 03 Section: Concrete Reinforcement
2. Division 03 Section: Cast-in-Place Concrete

1.2 QUALITY ASSURANCE

A. Qualifications of Workmen:

1. Provide at least one person who shall be present at all times during execution of this portion of the Work.
2. This workman shall be thoroughly familiar with the type of materials being installed, the referenced standards, and the requirements of this work.
3. This workman shall direct all work performed under this Section.

B. Codes and Standards:

1. In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations and maintain tolerances contained in "Recommended Practice for Concrete Formwork," publication ACI 347-Latest Edition of the American Concrete Institute.
2. Where provisions of pertinent codes and standards conflict with the requirements of this Section of the Project Manual, the more stringent provisions shall govern.
3. Tolerance limits per ACI 117-Latest Edition.

    a. Form concrete and set screeds or bulkheads so maximum variation in slab elevation in any bay does not exceed 1/2 inch.

C. Design:

1. Design of formwork, shoring and reshoring by a Professional Engineer of the State where the project is located.

1.3 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to protect formwork materials before, during, and after installation and to protect the installed work and materials of all other trades.
2. Special precautions, as required to protect permanent steel forms and formwork for exposed concrete, shall be utilized after erection.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Form Lumber:

1. All form lumber in contact with exposed concrete shall be new or of sufficient quality to insure an unblemished texture.
2. All form lumber shall be one of the following or a combination thereof.

    a. Plywood, board lumber, hardwood, or other material of grade or quality to best suit each particular usage.

B. Steel Forms:

1. Steel is an acceptable material for formwork.
2. Steel forms shall be "like new" producing a clean, smooth, unblemished texture for concrete exposed in the finished structure. Do not use damaged forms.

C. Fiber Forms:

1. Fiber forms may be utilized to construct round columns/piers.
2. Seamless forms shall be used for concrete exposed in the finished structure.
3. Standard seamed tubes are permissible for non-exposed concrete.

D. Form Release Agent: Provide non-staining and non-emulsifiable form release agent.

1. Standards:

    a. Release agent shall be similar to Magic Kote by Dayton Superior.
    b. Acceptable manufacturer: BASF Construction Chemicals, W.R. Meadows

E. Bracing/Shoring/Studs:

1. Such supports shall be selected for economy consistent with safety requirements and the quality required in the finished work. The Contractor is responsible for the design, illustration, safety, and serviceability of all formwork.

2.2 TIES/SPREADERS/ACCESSORIES

A. Type:

1. All form ties shall be a type which does not leave an open hole through the concrete and which permits neat and solid patching at every hole.
2. Spreaders shall be commercially manufactured devices compatible with the system.

B. Design:

1. When forms are removed, ties remaining within the concrete shall be not less than 1" from the surface.
2. Utilize ties with removable plastic cones where concrete will be exposed in the finished structure.

C. Wire Ties and Wood Spreaders:

1. Do not use wire ties and wood spreaders.

D. Other Materials:

1. All other materials not specifically described but required for proper completion of concrete formwork, shall be as selected by the Contractor subject to advance acceptance by the Architect/Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this Section, carefully inspect the installed work of all trades and verify that all such work is complete to the point where form installation may properly commence.
2. Review the Contract Documents, including Addenda and Post Bid Revisions, as applicable, to determine all Contract requirements/details.
3. Verify that forms may be constructed in accordance with all pertinent codes and regulations, the referenced standards, and the original design.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect/Engineer.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 CONSTRUCTION OF FORMS

A. General:

1. Construct all required forms to be substantial, sufficiently tight to prevent leakage of mortar.
2. The design and engineering of the formwork shall be the responsibility of the Contractor.
3. Formwork shall be designed for wet concrete and construction loads, lateral pressures, wind loads, and all other loads anticipated during construction.
4. Provide shoring and bracing as required to prevent undue deflection or bulging of concrete.
5. Provide removable sections at the base of forms, where required, to permit removal of debris, water, etc., from the formwork for walls and deep beams.

B. Layout:

1. Form for all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the drawings.
2. Exercise particular care in the layout of forms to ensure the proper finish structure size and shape.
3. Make proper provision for all openings, offsets, recesses, anchorage, blocking, and other features of the Work as shown or required.
4. Carefully examine the Contract Documents and consult with other trades as required to insure proper provisions for openings, reglets, chases, and other items in the forms.
5. Camber forms as required to allow for form deflections, slippage, and settlement of shores during concrete placement.

C. Embedded Items:

1. Set all required steel frames, angles, grilles, bolts, reglets, inserts, pipe, conduit, and other such items required to be anchored in the concrete before the concrete is placed.

D. Bracing and Shoring:

1. Properly brace and tie the forms together so as to maintain position and shape and to ensure safety to personnel.
2. Construct all bracing, supporting members, and centering of ample size and strength to safely carry, without excessive deflection, all dead and live loads to which they may be subjected.
3. Properly space the forms apart and securely tie them together, using metal spreader ties that give positive tying and accurate spreading.
4. All shoring shall extend to adequate foundations.
5. Shores supporting successive stories shall be placed directly over those below or be so designed and placed to prevent overload on the structure below.
6. The Contractor is responsible for both the proper design and installation of all bracing and shoring, to properly ensure the safety and serviceability of the structure.

E. Tolerances:

1. Construct all forms straight, true, plumb, and square within the tolerances recommended by ACI 347.
2. Formed surfaces shall be Class A.

a. Abrupt irregularities in formed surfaces exposed to view in final construction shall not exceed 1/8 inch.

3. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

a. Level Alignment: Variance in elevation of top of slab in any structural bay shall not exceed 1/2 inch.

F. Wetting:

1. Keep forms sufficiently wetted to prevent joints opening up before concrete is placed, except as recommended in ACI 306 R-78, "Recommended Practice for Cold Weather Concreting."

G. Construction Joints:

1. Refer to Division 03 Section: Cast-In-Place-Concrete of this Project Manual.

3.3 PLYWOOD FORMS

A. Assembly:

1. Nail the plywood panels directly to studs and apply in a manner to minimize the number of joints.

B. Joints:

1. Make all panel joints tight butt joints with all edges true and square.

3.4 FOOTING FORMS

A. Side Forms:

1. All footing sides shall be formed unless otherwise specifically authorized by the Architect/Engineer.

3.5 REUSE OF FORMS

A. Requirements:

1. Reuse of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtainable if all forms were new.
2. Reuse of forms shall in no way impart less structural stability to the forms, nor less acceptable appearance to finished concrete.

3.6 CLEAN-UP

A. General:

1. Before concrete is placed the forms shall be cleaned of all debris, ice, snow, frost, and standing water.
2. Remove all loose earth materials from the surfaces of earth forms.

3.7 REMOVAL OF FORMS

A. General:

1. Forms shall be removed in such manner to ensure complete safety of the structure.
2. Formwork for columns, walls, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations with the following minimums:

    a. Formwork for walls and columns shall remain in place a minimum of two (2) days during which the temperature of the air surrounding the concrete must be above 50□F.
    b. This minimum time period represents a cumulative number of days or fractions thereof.
    c. Such formwork for concrete placed during cold weather with surrounding air temperatures below 50□F shall remain in place one day after the artificial heating and/or freeze protection is discontinued/ removed.

3. Forms and falsework supporting any vertical loads shall remain in place until the members have acquired sufficient strength to safely support their weight and any superimposed loads. Such forming shall remain in place until the concrete has attained its specified 28 day strength as indicated by the test cylinders unless reshores are installed in sufficient quantities to transmit the loads to adequate foundations without over stressing the partially cured structure. The requirements of ACI 305 and 306 must also be met before forms may be removed.
4. Forms for load bearing superstructure concrete shall never be removed earlier than seven (7) days after the concrete is placed.
5. Removal of forms and falsework is the responsibility of the Contractor, and the Contractor shall bear the full responsibility for this operation.
6. Concrete damaged by too early removal of forms or falsework shall be repaired or replaced as directed by the Architect/Engineer.
7. Concrete exposed by form removal during the curing period shall be cured by one of the methods specified in Division 03 Section: Cast-In-Place-Concrete.
8. Note that curing compound is not permitted in certain locations. In these cases, curing is to be by an alternate method. See Cast-in-Place Concrete specification for alternate methods.
9. In no case shall the superimposed load on relatively new concrete exceed 50 pounds per square foot unless proper shoring to suitable foundations is installed as required by the Architect/Engineer.

B. Removal

1. Use all means necessary to protect workmen, passers-by, the installed work and materials of other trades, and the complete safety of the structure.
2. Cut nails and similar fasteners off flush and leave all surfaces smooth and clean.
3. Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface and pointing up and rubbing the resulting pockets to match the surrounding areas.

END OF SECTION

SECTION 03 20 00 – CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install all bar supports, inserts, anchor bolts, welded wire fabric, reinforcing bars and all other items to be embedded in the cast-in-place concrete, not specifically indicated to be by others, as shown or implied on the Contract Documents.

B. Related Sections:

1. Division 03 Section: Concrete Formwork
2. Division 03 Section: Cast-in-Place Concrete
3. Division 03 Section: Epoxy Grout

1.2 QUALITY ASSURANCE

A. Qualifications of Workmen:

1. Provide at least one person who shall be present at all times during execution of this portion of the work.
2. This workman shall be thoroughly familiar with the type of materials being installed and the best methods for their installation.
3. This workman shall direct all work performed under this Section.

B. Codes and Standards:

1. In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations contained in ACI 315 – Manual of Standard Practice for Detailing Reinforced Concrete Structures and ACI 318 - Building Code Requirements for Reinforced Concrete.
2. Where provisions of pertinent codes and standards conflict with this Section of the Project Manual, the more stringent provisions shall govern.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings to the Architect/Engineer defining details of concrete reinforcement in accordance with Division 01 Section: Submittals of this Project Manual.
2. Reinforcing for concrete walls shall be shown on scale elevations of the walls.
3. The Contractor may release shop drawings for fabrication at his discretion; however, the Contractor shall bear all financial responsibility for changes to the shop drawings up

to the time they are marked "Furnish as Submitted." Actual field installation shall only be made with shop drawings marked "Furnish as Submitted."

4. Where hooks are indicated on the Contract Drawings, provide standard hooks unless otherwise noted.
5. All accessories necessary for support of reinforcing steel shall be shown in plan. Do not schedule accessories.

B. Certifications:

1. Submit a certification that all material used is in accordance with the requirements of this Section.

1.4 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to protect concrete reinforcement before, during, and after installation and to protect the installed work and materials of all other trades.
2. Store in a manner to prevent excessive rusting and fouling with dirt, grease, and other bond-breaking coatings.

B. Replacements:

1. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars and Dowels:

1. Conform to ASTM A615, Grade 60.
2. Reinforcing that is to be welded shall conform to ASTM A615, Grade 40.
3. Epoxy coated bars (required only where noted) shall meet the requirements of ASTM A884.

B. Welded Wire Fabric:

1. Conform to ASTM A1064, 6 x 6 x W 2.1x W 2.1, or as indicated on the drawings. Welded wire fabric shall be furnished in the flat sheet form in lieu of roll form.
2. Epoxy coated welded wire fabric (required only where noted) shall meet the requirements of ASTM A884.

C. Other Embedded Items:

1. Provide standard manufactured products as approved by the Architect/Engineer.

D. Bar Supports:

1. Conform to the requirements of the "Manual of Standard Practice," published by the Concrete Reinforcing Steel Institute.
2. Accessories shall be plastic protected Class "C" for all concrete exposed in the finished structure, except as specified below.
3. Accessories shall be Class "A," bright basic, for unexposed concrete.
4. Utilize Class "E," stainless steel bar supports, for exterior concrete to be finished by sand blasting.
5. Do not use continuous high chairs. Use individual high chairs laced with bottom cross bars plus #5 support bars. (Minimum of 2 rows of supports for all reinforcing.)
6. Supports must be capable of supporting construction loads without failing. Contractor to furnish additional supports at no cost to the Owner if in the Architect/Engineer's estimation the supports are not adequate.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that concrete reinforcement may be installed in strict accordance with all pertinent codes and regulations and original design.

B. Discrepancies:

1. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

A. General:

1. Remove all dirt, oil, paint, loose rust, and other foreign materials from the concrete reinforcement prior to replacement.

3.3 PLACING

A. Reinforcing Bars:

1. Place reinforcing steel accurately in conformance with shop drawings stamped "Furnish as Submitted" by the Architect/Engineer.
2. Positively secure reinforcing to bar supports and tie or otherwise anchor bars to prevent displacement by construction loads or by the placing of concrete.

3. Splice bars with a minimum lap of 40 bar diameters, unless otherwise indicated. Use mechanical splicers/couplers where quantity of reinforcement restricts placement of concrete if lapped splices are utilized. Install mechanical splice as recommended by manufacturer.
4. Splice bars only at locations indicated on the Contract Documents and shop drawings.
5. Both shop and field bending shall be accomplished without heating the bars.
6. Minor placing adjustments can be made to avoid interference with other reinforcement and/or embedded devices. The final arrangement, however, is subject to review and acceptance of the Architect/Engineer.
7. Immediately notify the Architect/Engineer if reinforcing cannot be installed as detailed on the "Furnish as Submitted" shop drawings. No cutting of reinforcing should occur unless the Architect/Engineer has reviewed and allowed such cuts.

B. Embedded Devices:

1. Set hangers, anchor bolts, inserts, and other embedded devices accurately in place.
2. Make sure all such devices are installed so that work to be attached thereto will be properly received.
3. Keep devices straight and true-to-line.

C. Welded Wire Fabric:

1. Splice the welded wire fabric by lapping each section at least two meshes wide plus one wire with the adjacent section, but not less than 8".
2. Extend fabric into all openings, doorways, and the like, unless otherwise indicated.
3. Reinforce all equipment pads with 6x6-W2.1xW2.1 welded wire fabric unless otherwise indicated.
4. Support the welded wire fabric over metal deck in floor or roof slabs with continuous slab bolster – upper (with continuous bars at the top and bottom) spaced at 2'-6" o.c. maximum.
5. Support the welded wire fabric in slab-on-grade, with #4 continuous bars spaced at 2'-6" o.c. (maximum in one direction) and supported on concrete brick spaced at 2'-6" o.c.

3.4 CLEANING REINFORCING

A. Final Cleaning:

1. Prior to casting concrete, all loose mill and rust scale, oil, mud, ice, and other foreign coatings which destroy and/or reduce bond between the reinforcement and concrete shall be removed.
2. Wire brushing and/or other suitable methods shall be used to complete cleaning operations.

3.5 INSPECTION

A. Scheduling:

1. Notify the Architect/Engineer 24 hours in advance that forms and reinforcing are in place and are ready for inspection. Keep Architect/Engineer informed of the basic

schedule so that he can anticipate inspection times in advance of the required 24-hour notice. Canceled pours are subject to additional inspection charges by the Architect/Engineer against the Contractor where the Architect/Engineer representative is already in route to the site at the time the concrete pour is canceled. Inspection costs shall be based upon the hourly rate of the Architect/Engineer representative plus travel expenses.

2. Do not cast concrete until the Architect/Engineer has observed and accepted the installation.
3. Premature notification of the Architect/Engineer to inspect the reinforcement of forms shall be subject to additional inspection charges by the Architect/Engineer as described above.

END OF SECTION

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete as shown or implied by the Contract Documents.
2. Coordinate installation of vapor retarder, specified in Division 07.
3. Concrete fill in metal stair pans.
4. Concrete requirements for housekeeping pads and inertial isolation slabs.

B. Related Sections:

1. Division 03 Section: Concrete Formwork
2. Division 03 Section: Concrete Reinforcement
3. Division 03 Section: Grouting
4. Division 05 Section: Composite Metal Decking

1.2 REFERENCES

A. American Concrete Institute (ACI):

1. 116R – Cement and Concrete Terminology
2. 117 – Standard Specifications for Tolerances for Concrete Construction and Materials
3. 211.1 – Standard Practice For Selecting Proportions For Normal, Heavy Weight, And Mass Concrete
4. 211.2 – Standard Practice For Selecting Proportions For Structural Lightweight Concrete
5. 214 – Recommended Practice For Evaluation Of Strength Test Results Of Concrete
6. 301 – Specifications for Structural Concrete
7. 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete
8. 305 R – Recommended Practice For Hot Weather Concreting
9. 306 R – Recommended Practice For Cold Weather Concreting
10. 318 – Building Code Requirements For Reinforced Concrete

B. ASTM International (ASTM):

1. C 33 – Standard Specification for Concrete Aggregates
2. C 94 – Standard Specification for Ready-Mixed Concrete
3. C 143 – Standard Test Method for Slump of Hydraulic Cement Concrete
4. C 150 – Standard Specification for Portland Cement
5. C 260 – Standard Specification for Air-Entraining Admixtures for Concrete
6. C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
7. C 330 – Standard Specification for Lightweight Aggregates for Structural Concrete

8. C 494 – Standard Specification for Chemical Admixtures for Concrete
9. C 618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
10. D 6 – Standard Test Method for Loss on Heating of Oil and Asphaltic Compounds
11. D 297 – Standard Test Methods for Rubber Products-Chemical Analysis
12. D 994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
13. D 1752 – Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
14. E 1155 – Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers
15. F609 – Standard Test Methods for static slip resistance of Footwear sole, heel, or related materials by horizontal-pull slipmeter.

1.3 SUBMITTALS

A. Product Data: Submit manufacturers literature for each type of product furnished.

B. Shop Drawings:

1. Provide layout drawings for coordination of floor slab pours. Indicate locations of expansion joints, construction joints, and control joints.

C. Quality Assurance Submittals:

1. Concrete Mix: Submit proposed concrete mix designs for each strength, slump, and combination of admixtures required for the Project.
2. Test Reports:

a. Submit chloride ion tests or total chloride tests (with generally accepted method to relate total chloride to chloride ion) to show compliance with maximum ion concentrations.

1) Tests may be from another job, utilizing the same proportions of aggregates, cements, and admixtures.

b. Submit slump, air-entrainment, compressive strength, and flatness and levelness test reports to the Architect/Engineer.

1.4 QUALITY ASSURANCE

A. Codes and Standards:

1. In addition to complying with all pertinent codes and regulations, comply with all pertinent requirements of the following American Concrete Institute Publications:

a. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials

b. ACI 211.1 – Standard Practice For Selecting Proportions For Normal, Heavy Weight, And Mass Concrete
c. ACI 211.2 – Standard Practice For Selecting Proportions For Structural Lightweight Concrete
d. ACI 214 – Recommended Practice For Evaluation Of Strength Test Results Of Concrete
e. ACI 305 R – Recommended Practice For Hot Weather Concreting
f. ACI 306 R – Recommended Practice For Cold Weather Concreting
g. ACI 318 – Building Code Requirements For Reinforced Concrete

2. Where provisions of pertinent codes and standards conflict with this section of the Project Manual, the more stringent provisions shall govern.

B. Qualification for Testing:

1. The following field-testing procedures shall be performed only by personnel holding current certificates issued by ACI for Concrete Field Testing Technician - Grade I as required by the local code.

a. Sampling of fresh concrete
b. Testing fresh concrete for slump
c. Testing fresh concrete for entrained air
d. Making concrete specimens for compression tests

2. Flatness and levelness testing: Floor flatness and levelness testing shall be performed by a technician trained in the use of the testing equipment and the procedures of ASTM E 1155.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section: Project Management and Coordination. Review methods and procedures related to concrete Work, including, but not limited to, the following:

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review requirements for concrete tolerances, finishing, and curing methods, prior to commencing concrete work

a. Include floor covering installers, to review specific tolerance and finish requirements.

D. Mockups: Cast concrete slab-on-grade panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Build panel approximately 36 sq. ft. for slab-on-grade in the location indicated or, if not indicated, as directed by Architect/owner to be demolished after project

1.5 PROJECT CONDITIONS

A. Environment Conditions:

1. Extreme temperature conditions:

a. When extreme hot or cold weather conditions occur, or are expected to occur, which might detrimentally affect concrete, employ handling and placing techniques to guard against such effects.

1) Comply with the ACI nomograph attached to the end of this Section.

b. Comply with the recommendations of American Concrete Institute publications ACI 305 R and ACI 306 R, for hot and cold weather concreting.

2. Inclement weather:

a. Unless adequate protection is provided, do not place exterior concrete during rain, sleet, or snow.
b. Do not use calcium chloride or admixtures containing soluble chlorides.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement: ASTM C 150, Type I or III

B. Fine Aggregate: ASTM C 33 with fineness modules, 2.40 to 3.00. For pumped concrete, 15 to 30% passing number 50 sieve and 5 to 10% passing a number 100 sieve.

C. Coarse Aggregate:

1. ASTM C 33 with maximum size:

a. Three-fourths of minimum clear spacing between reinforcing bars or between bars and forms

2. Provide crushed stone for sidewalks, curbs, and exterior slabs/stairs
3. Pea gravel shall not be used as an aggregate for any part of the elevated structure or the foundation system. Pea gravel may be acceptable for miscellaneous structural items as approved by the Architect/Engineer.

D. Lightweight Aggregate: ASTM C 330.

1. Nominal maximum size: 3/4"
2. Pre-soak aggregate prior to mixing in accordance with aggregate supplier recommendations

E. Water: Clean, fresh, potable.

F. Air-Entraining Admixture: ASTM C 260

G. Concrete shall not exceed maximum chloride ion content for corrosion protection as defined in ACI 318 Table 4.4.1.

H. Fly Ash: ASTM C 618, Class C or F.

1. Fly ash shall not replace more than 20% of the cement.

I. Curing and Sealing Compounds:

1. Products: Furnish one of the following curing or curing and sealing compounds for each application listed:

a. Interior concrete slabs to receive floor coverings or other applied material: ASTM C 309, Type 1D, Class B; water based, all resin, dissipating, VOC compliant, clear with fugitive dye.

1) Conspec Marketing & Manufacturing Co., Inc.; WB Resin Cure
2) Dayton Superior Chemical Division; Day-Chem Rez Cure (J-11-W)
3) L&M Construction Chemicals, Inc.; Cure R
4) W.R. Meadows; 1100 (Clear)

b. Interior concrete slabs, finish scheduled as sealed concrete, or formed concrete requiring use of a curing compound: ASTM C 309, Type 1, Class B; water based, all resin, VOC compliant, clear.

1) Dayton Superior Chemical Division; Safe Cure & Seal (J-18)
2) Euclid Chemical Company; Aqua-Cure VOX
3) L&M Construction Chemicals, Inc.; Dress & Seal WB
4) W.R. Meadows; Vocomp
5) BASF Construction Chemicals; Sonneborn; Kure-N-Seal W

c. Interior concrete slabs, finish scheduled as hardener/sealer or hardened sealed concrete: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

1) Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
2) Curecrete Distribution Inc.; Ashford Formula.
3) Dayton Superior Corporation; Day-Chem Sure Hard.
4) Euclid Chemical Company (The); Euco Diamond Hard.
5) L&M Construction Chemicals, Inc.; Seal Hard.
6) Meadows, W. R., Inc.; Liqui-Hard.
7) Symons Corporation, a Dayton Superior Company; Buff Hard.

d. Product used shall be compatible with waterproofing if forms are stripped from concrete to receive waterproofing prior to 7 days curing above 50□F.
e. Refer to Part 3 Article "Curing" for removal of curing compounds.

2. If curing compound is not used, and the forms are stripped prior to 7 days curing, the following methods are approved:

a. Ponding or continuous sprinkling
b. Continuously wet mats

c. Sand kept continuously wet

J. Expansion Strips:

1. Self-expanding cork: ASTM D 1752, Type III, preformed, self-expanding strips formed of cork particles with a non-bitumen, isolable resin binder for all interior and exterior slabs at building vertical faces, or as noted.
2. Asphaltic board expansion joint: ASTM D 994, preformed joint material. Material shall not deform under normal handling, or become brittle. Use in exterior slabs, except at building vertical faces or as noted.
3. Closed-cell poly

K. Waterstops:

1. 20 OZ. Copper formed to shapes shown on the drawings.
2. PVC flat ribbed waterstops:

a. Manufacturers:

1) Vinylex Corporation
2) Greenstreak.

b. Shapes and sizes to be reviewed by the Architect/Engineer.

3. PVC dumbbell waterstops:

a. Manufacturers:

1) Vinylex Corporation
2) Greenstreak.

b. Shapes and sizes to be reviewed by the Architect/Engineer.

4. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

a. Products: Subject to compliance with requirements, provide one of the following:
1) Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
2) CETCO; Volclay Waterstop-RX.
3) Concrete Sealants Inc.; Conseal CS-231.
4) Greenstreak; Swellstop.
5) Henry Company, Sealants Division; Hydro-Flex.
6) JP Specialties, Inc.; Earth Shield Type 20.

5. Additional types, shapes, and sizes to fit the job conditions, with review by Architect/Engineer.

a. Standard: Vinylex Corporation

L. Dovetail Anchor Slot and Reglets:

1. Standard:

    a. Dovetail anchor slot No. 100 as manufactured by Heckmann Building Products, Inc.; 22 gauge galvanized steel.
    b. Dayton Superior Corporation, Dur-O-Wall Division; D/A 100
    c. Stay-put reglets as manufactured by Heckmann Building Products, Inc., 26 gage galvanized steel.

M. Joint Sealant:

1. Flatwork: Two-part polysulfide compound

    a. Standard: "Euco Polysulphide sealant" by the Euclid Chemical Company

2. Vertical joints: Two-part polysulfide compound

    a. Standard: W.R. Meadows CM-60

3. Vertical joints: Two-part polyurethane, refer to Section 07920.

N. Water Reducing Admixtures:

1. Normal set: ASTM C 494, Type A
2. Retarders: ASTM C 494, Type D
3. Accelerators: ASTM C 494, Type C or E
4. High range water reducers: ASTM C 494, Type F

O. Crystalline Waterproofing Admixture: Waterproofing admixture that reacts with concrete to form dendritic crystalline structures in concrete pores and cracks.

1. Acceptable products:

    a. Kryton international Inc.: Krystol Internal; Krystol Internal Membrane for Concrete.
    b. Xypex Chemical Corporation:; Xypex Admixture

P. Evaporation Retardant:

1. Standard: Master Builders Confilm; Degussa Building Systems
2. Apply per manufacturer's directions.

Q. Vapor Retarders:

1. Refer to Division 07 Section: Vapor Retarders, or use the information within this section if there is no Specification section which pertains to vapor retarders.

2. Plastic Vapor Barrier: ASTM E 1745, Class A with a permeance of 0.01 as tested before and after mandatory conditioning (ASTM E 1745 Section 7.1 and sub paragraph 7.1.1-7.1.5) less than 0.01 perms (grains/(ft^2 hr in Hg). Include manufacturer's recommended adhesive or pressure sensitive tape.
    a. Products:

1) Fortifiber Corporation; Moistop Ultra 15.
2) Reef Industries; Griffolyn G 15.
3) Stego Industries, Stego Wrap 15.

R. Bond Break:

1. 15 pound per square (100 sq.ft.) building paper

S. Bonding Agent:

1. Select bonding agent to suite the job condition and application.
2. Products:

   a. Conpro Primer by Conproco Corp.
   b. SBR Latex by the Euclid Chemical Company.
   c. Everweld by L&M Construction Chemicals Inc.

3. Apply per manufacturer recommendations.
4. Finished concrete surface shall be roughened and cleaned, prior to application of the bonding agent.

2.2 MIX DESIGNS

A. Normal Weight Concrete:

1. Compressive strength: 4000 PSI.
2. Minimum cement content: 517 pounds per cubic yard (adjust for air entrainment).
3. Water/cement ratio: 0.45 maximum (Typical) 0.40 for concrete exposed to deicing salts, blackish water or salt spray, no water to be added to concrete after plant batching.
4. Slump: 4" + 1", adjust with addition of the admixture for pumping.
5. Typical for slabs unless walls, beams, columns and footing noted otherwise.

B. Normal Weight Concrete:

1. Compressive strength: 6000 PSI.
2. Minimum cement content: 752 pounds per cubic yard (adjust for air entrainment).
3. Water/cement ratio: 0.40 maximum, no water to be added to concrete after plant batching.
4. Slump: 4" + 1", adjust with addition of the admixture for pumping.
5. Use only where specified.

C. Lightweight structural concrete:

1. Compressive strength: 4000 PSI.
2. Density: 110 pounds per cubic foot
3. Minimum cement content 650 pounds per cubic yard.
4. Water/Cement Ratio: 0.45 maximum, excluding water held in lightweight aggregate, no water to be added to concrete after plant batching..
5. Slump:

a. 4" ± 1", if not pumped.
b. 6" to 10" slump, if concrete is to be pumped. Achieve high slump using water-reducing admixtures.

6. Use for all concrete over composite metal deck.

D. Air-Entrainment:

1. Provide air entrainment at:

a. All concrete that is to be exposed to the elements (weather) in the completed structure.
b. All concrete in contact with salts.

2. All other concrete may be air-entrained or non-air-entrained, at the Contractor's option.

a. Hard-troweled finishes shall not have air-entrainment.

3. Percentage of air content shall be determined in accordance with the admixture manufacturer's recommendations, to meet ASTM C173 or ASTM C231, based on aggregate size and a moderate level of exposure.

E. Selection of Concrete Proportions:

1. Proportions of materials for concrete shall be established in accordance with Section 5.2 of ACI 318.

2. Follow ACI 211 and ACI 301 to determine the water-cement ratio for lightweight concrete.

3. Concrete Mixing:
a. Plant mix concrete materials in same proportions as approved concrete mix design in accordance with ACI 304.
1) Incorporate admixtures in quantities and using methods recommended by admixture manufacturers.
2) Incorporate only admixtures included in the approved mix design, or with approval by Architect/Engineer.
b. Do not add water to batched concrete without approval by Architect/Engineer.

F. High Slump Concrete:

1. Slumps greater than those specified may be used (up to 10") under the following conditions:

a. Prior approval has been obtained from the Architect/Engineer, including location of pours and proposed mixes.
b. Admixture systems or high range water reducers are used to achieve the high slumps.
c. Water-cement ratios are compatible with normal mixes.
d. Compressive strength of the concrete exceeds normal mixes at specified slumps.

e. If high range water reducers are used, the admixture is added by a concrete technician employed by the concrete supplier.

2. Submit mix designs to Architect/Engineer for review.
3. This review is made to ensure that portions of the mix meet the specifications. All performance related criteria must still be met.

G. Crystalline Waterproofing:

1. Add crystalline waterproofing admixture at a rate of 2-3 percent by weight of portland cement content.
2. Provide in concrete where "integral crystalline waterproofing" or "integral waterproofing" is indicated.

PART 3 - EXECUTION

3.1 SITE VERIFICATION OF CONDITIONS

A. Inspection:

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that all items to be embedded in concrete are in place.
3. Verify that concrete may be placed to the lines and elevations indicated on the Drawings, with all required clearance from reinforcement.

B. Discrepancies:

1. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

A. Remove all wood scraps, ice, snow, frost, standing water, and debris from the area in which concrete will be placed.

B. Thoroughly wet the surface of excavations (except in freezing weather), coat forms with release agent, and remove all standing water.

C. Thoroughly clean all transporting and handling equipment.

D. All concrete slabs on grade to be placed on a granular fill. Depth of fill to equal the slab thickness unless otherwise noted.

E. Substrate over which the vapor barrier will be placed shall be compacted, smooth, and free of glass, large stones, and other objects that might puncture the barrier.

3.3 CONCRETE MIXING

A. Plant mix concrete materials in same proportions as approved concrete mix design and in accordance with ACI 304.

1. Incorporate admixtures in quantities and using methods recommended by admixture manufacturers.
2. Incorporate only admixtures included in the approved mix design, or with approval by Architect/Engineer.

B. Do not add water to batched concrete without approval by Architect/Engineer.

3.4 PLACING CONCRETE

A. Method:

1. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
2. For chuting, pumping, and pneumatically conveying concrete, use only equipment of such size and design as to ensure a practically continuous flow of concrete at the delivery end without loss or separation of materials.
3. Deposit concrete as nearly as possible in its final position to avoid segregation due to re-handling and flowing.
4. Contractor shall use screed poles or similar devices to ensure that all slabs are cast at the proper elevations and that specified tolerances are maintained.
5. Deflections of supporting structure are to be anticipated to produce a level slab.

B. Rate of Placement:

1. Place concrete at such a rate that concrete is at all times plastic and flows readily between reinforcement.
2. When placing is once started, carry it on as a continuous operation until placement of the panel or section is complete.
3. Do not pour a greater area at one time than can be properly finished; this is particularly important during hot or dry weather.

C. Compaction:

1. Thoroughly consolidate all concrete by suitable means during placement, working it around all embedded fixtures and into corners of forms.
2. During placement, thoroughly compact the concrete by hand tamping and by mechanical vibration.

D. Acceptability:

1. Do not use retempered concrete or concrete that has been contaminated by foreign materials.

E. Limits of Pour:

1. Minimum time period between adjacent pours shall be 24 hours.

2. The contractor shall be responsible for all pour limits, sizes, and sequences. The contractor shall dictate construction procedures and account for temperature differentials and shrinkage during the construction phase until the building is permanently in a mechanically controlled environment.

3.5 LEVELING AND FINISHING

A. General: Finish concrete in accordance with ACI 301.

B. Finishing Exposed Walls:

1. Remove fins and fill tie holes, honeycombs and air holes (bug holes).
2. Provide a rubbed finish on all interior exposed concrete walls.
3. Provide a smooth rubbed finish on all exposed exterior concrete walls, including site walls.
4. Finishing methods:

    a. Rubbed finish:

        1) Not later than one day after form removal, rub with carborundum brick or another abrasive to remove fins, ridges and other surface irregularities.

    b. Smooth rubbed finish:

        1) Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

C. Finishing Slabs, Flatwork, Walk, Stairs:

1. Trowel all interior slabs to a smooth, hard finish unless otherwise indicated.

    a. Provide a non-slip finish in all areas subject to public traffic.

2. Surfaces to receive a light broom finish:

    a. Exterior slabs, walks, stairs
    b. Interior floors to receive a dry set mortar installation of ceramic tile, tile, or pavers.
    c. Interior stair treads not scheduled to receive floor covering

3. Where floor drains or floor slopes are indicated, slope slabs uniformly to provide even fall for drainage.

D. Tolerances:

1. Place concrete so members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

    a. Level Alignment: Variance in elevation of top of slab in any typical structural bay shall not exceed 1/2 inch.
    b. Structural Steel and composite metal deck structures: Concrete shall be placed in a manner that produces a slab that will meet the specified flatness and levelness tolerances prior to application of any superimposed loads.

2. Floor slabs: Finish floor slabs to meet the following flatness and levelness test requirements.
3. Definitions:

    a. Test surface: The entire floor area on any one building level.
    b. Test Section: Any subdivision of the test surface measuring no less than 8 feet on a side and no less than 320 square feet.

4. Test Sections less than 8 feet on a side or less than 320 square feet or at slab boundaries, block-outs or other discontinuities excluded by ASTM E 1155: Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot- (3.05-m-) long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 1/4 inch.

    a. Finish interior slab surfaces to the following tolerances, measured with a Type II apparatus within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface. Submit report to the Architect/Engineer within 72 hours of concrete placement.

        1) Specified overall values of flatness, F_F 30; and levelness, F_L 20; with minimum local values of flatness, F_F 24; and levelness, F_L 15.

3.6 JOINTS

A. Expansion Joints:

1. Provide where indicated on the Contract Documents.
2. Install expansion strips full depth of joints.
3. Where caulking of joints is indicated on Drawings, install fillers to 1/2 inch of top and pour full with sealant.

    a. Standard: See "Joint Sealant for Flatwork," this section.

4. Provide self-expanding cork at all intersections of exterior concrete and vertical surfaces. Caulk top 1/2 inch of joint.
5. Where asphalt expansion joints are not sealed hold top of asphalt 1/4 inch below abutting concrete. Tool joints on both sides of expansion joint.

B. Tooled Joints:

1. Provide standard tooled joints where indicated on the Contract Documents.

2. Make joints straight, clean, and unragged.
3. Tool concrete on both sides of asphalt pavement.

C. Construction Joints:

1. Joints shall be made with properly constructed bulkheads and include formed keyways.
2. Reinforcing shall extend through all construction joints unless otherwise noted on the Contract Documents.
3. The Contractor shall consult with the Architect/Engineer before starting concrete work to establish a satisfactory placing schedule and to determine the location of construction joints so as to minimize the effects on the floor systems.
4. Horizontal construction joints, other than where shown on the Contract Documents, will not be permitted.
5. Vertical construction joints shall be located between quarter and third points of the spans. Submit construction joint layout for A/E review and approval.
6. If diamond blockouts are used around columns at the slab on grade level, the diamond must be poured to within plus or minus 1/16th of an inch in elevation with respect to the surrounding slab on grade. Floor prep as required to assure the blockout joint does not show through the flooring material.

D. Control Joints:

1. Control joints shall be provided in all slabs on grade unless waived by the Architect/Engineer. Elevated slabs shall not have control joints unless specifically detailed. Joints may not be required under carpet and sheet vinyl floor finishes.
2. Locate as shown on drawings or along column lines and at intervals not exceeding 20 feet in each direction. Review location with A/E prior to pouring slabs.
3. Control joints shall be 1/4 of the slab thickness and shall be sealed in accordance with "Joint Sealant" this section. Saw cut joints within 12 hours of placing the slab.

E. Bond Break:

1. Install where indicated. Lap seams a minimum of 4 inches.

F. Waterstops:

1. Install where indicated.
2. Vinyl waterstop joints shall be chemically or heat welded per manufacturer's recommendations.

    a. Install waterstop near center of concrete pour, unless otherwise indicated on Drawings.

3. Bentonite waterstops shall be installed in accordance with manufacturer’s instructions.

    a. Provide 3 inches minimum concrete cover.

3.7 CURING

A. Formed Surfaces:

1. Cure formed surfaces by either of the following methods:

   a. Refer to Division 03 Section "Formwork" for minimum time periods that formwork must remain in place even when curing compound is used.
   b. Leave forms in place until the cumulative number of days or fractions thereof, not necessarily consecutive, has totaled seven days during which the temperature of the air in contact with the concrete is 50□F or above.
   c. Remove forms at an earlier time but apply curing compound to concrete surfaces.
   d. Apply compound in accordance with manufacturer's recommendations.
   e. Do not add curing/sealing compound to walls that receive waterproofing unless a letter has been submitted to the Architect/Engineer, prior to the compound's use, that the specific compounds are compatible with their system.

B. Troweled Finish:

1. As soon as surface has dried sufficiently to not be marred by the application, apply sealer/curing compound in accordance with manufacturer's recommendations.
2. Do not add curing/sealing compound to walls that receive waterproofing unless a letter has been submitted to Architect/Engineer, prior to the compound's use, that the specific compounds are compatible with their system.
3. After application, keep all traffic, tools, materials, and equipment off such treated areas for at least twenty-four hours.
4. For floors scheduled as sealed concrete, after all other work in the area has been completed, apply a second coat of sealer/curing compound.

C. Wet Cure:

1. Concrete not covered with curing compound should be kept wet for at least 7 days.
2. Keep forms continuously wet to prevent the moisture loss until forms are removed.

D. Curing Compound Removal:

1. Remove residual curing compound from floor slabs to receive applied finishes using methods recommended by the manufacturer of the curing compound.
2. Remove curing compound no earlier than 28 days after application or after structure is enclosed and protected from exterior water sources.
3. Wet mop or rinse and wet vacuum slab to remove traces of cleaning products.

E. Hardener/Sealer:

1. Apply to wet-cured concrete in accordance with manufacturer's instructions.

3.8 PATCHING AND REPAIR

A. Inspection/Remedial Work:

1. Immediately after forms and curing membranes have been removed, inspect all concrete surfaces and patch all pour joints, voids, rock pockets, form tie holds, and other imperfections before the concrete is thoroughly dry.

B. Patching and Minor Repairs:

1. At all permanently exposed portion of interior concrete formed surfaces, repair surface defects including color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface.

    a. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth.

        1) Make edges of cuts perpendicular to concrete surface.

    b. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    c. Fill and compact with patching mortar before bonding agent has dried.
    d. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color.

    a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete durability and structural performance as determined by Architect/Engineer.
4. Remove all fins, offsets and projections by dry-stoning surfaces which will be exposed in the finished structure or will receive waterproofing or other barrier coating or membrane.

    a. Provide additional patching of foundation wall for application of waterproofing membrane, in accordance with the manufacturer's recommendations.

5. Remove or fill all ridges, trowel marks, protrusions or pits more than 1/8-inch diameter on floor slabs by dry-stoning, grinding, or filling with trowelable cementitious underlayment.

C. Patching of Existing Concrete:

1. Patch in manner to receive new finishes so that existing and patched surfaces are smooth and continuous and have a uniform appearance, using methods specified for patching and repair.

D. Major Defective Areas:

1. If the defects are serious or affect the strength of the structure, or if patching does not satisfactorily restore the quality and appearance of the surface, the Architect/Engineer may require the concrete to be removed and replaced complete in accordance with the provisions of this Section, all at no additional cost to the Owner.
2. Floor slabs that do not meet tolerances specified shall be remediated by the Contractor to the elevation, flatness, or levelness specified at no additional cost to the Owner.

    a. Contractor shall use floor-leveling materials acceptable to the manufacturer of floor finishes scheduled for the area to be remediated.

3.9 TESTS

A. Testing Laboratory:

1. The owner shall engage the testing agency to conduct the testing for compliance with the requirements of the Project Manual.

B. Compression Tests:

1. Secure minimum five standard cylinders from each pour of concrete, additional five sets of cylinders for every 50 cubic yards of concrete placement of the day, in accordance with ASTM C31, and cure under standard moisture and temperature conditions.
2. From each batch test in accordance with ASTM C39.
3. Test two cylinders at 7 days and two cylinders at 28 days, and save one for additional test, if needed.
4. Submit duplicate tests reports of results from testing to Architect/Engineer.
5. Take steps immediately to evaluate unsatisfactory test results. Test the fifth cylinder.
6. In the event of unsatisfactory test results, an investigation as outlined in Section 5.6.4 of ACI 318-Latest Edition shall be employed.

C. Slump/Air-Entrainment:

1. Perform slump tests in accordance with ASTM C 143.
2. Determine the air content of air-entrained concrete in accordance with ASTM standards.
3. Report results of slump tests on each compression test report, and report whether the concrete represented by the compression tests is air-entrained or nonair-entrained.

D. Floor Profile:

1. Test floor profile in accordance with ASTM E 1155 within 24 hours of floor placement, before shoring is removed.
2. Submit test results to Architect/Engineer within 72 hours of concrete placement.

E. Retesting:

1. Should additional testing be required because of unsatisfactory tests results, the Contractor shall reimburse the owner for the costs incurred for correcting any deficiencies and the costs of any tests.

END OF SECTION

SECTION 03 41 00 STRUCTURAL PRECAST CONCRETE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

A. Refer to Section 01090 – Reference Standards
B. American Concrete Institute
    1. ACI 318 "Building Code Requirements for Structural Concrete"
C. Concrete Reinforcing Steel Institute
    1. Manual of Standard Practice
D. Prestressed Concrete Institute
    1. MNL 116 – "Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products"
    2. MNL 120 – "PCI Design Handbook – Precast and Prestressed Concrete"
E. American Welding Society
    1. Structural Welding Code

1.3 SUMMARY

A. This Section includes the performance criteria, materials, production, and erection of structural precast and precast, prestressed concrete for the entire project. The work performed under this Section includes all labor, material, equipment, related services, and supervision required for the manufacture and erection of the structural precast and precast, prestressed concrete work shown on the Contract Drawings.

B. This Section includes the following:
    1. Beams, columns, double tees, flat slabs.
    3. Walls.
    4. Spandrels.

C. Related Sections include the following:
    1. Division 3 Section "Hollow Core Planks." if applicable.
    2. Division 3 Section "Architectural Precast Concrete." if applicable.
    3. Division 3 Section "Cast-in-Place Concrete" for installing connection anchors in concrete and structural topping/ pour strips.
    4. Division 5 Section "Structural Steel" for structural steel framing and for furnishing and installing connections attached to structural steel framing.
    5. Division 5 Section "Metal Fabrications" for furnishing and installing loose hardware items.
    6. Division 7 Section "Through Penetration Firestopping Systems" for joint filler materials for fire-resistance-rated construction.
    7. Division 7 Section "Water Repellents" for water-repellent finish treatments.
    8. Division 7 Section "Sheet Metal Flashing and Trim" for flashing receivers and reglets.

9. Division 7 Section "Joint Sealants" for elastomeric joint sealants and sealant backings between slab edges at exposed underside of floor and roof members and/or perimeter of members.
10. Division 9 Section "Exterior Paints."

1.4 DEFINITION

1.5 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide structural precast concrete units and connections capable of withstanding design loads within limits and under conditions indicated on Drawings.

1. Loads: As indicated on drawings.

B. Structural Performance: Provide structural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated in the Structural Notes on the Contract Drawings.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated. Retain quality control records and certificates of compliance for 5 years or period of warranty, whichever is greater.

B. Design Mixes: For each precast concrete mixture. Include compressive strength and water-absorption tests, if required, for units with exterior exposure.

C. Erection Drawings: Detail fabrication and installation of structural precast concrete units. Indicate member locations, plans, elevations, dimensions, shapes, cross sections, openings, extent and location of each finish, connections, support conditions and types of reinforcement, including special reinforcement.
1. Indicate separate face and backup mix locations, if required.
2. Indicate welded connections by AWS standard symbols and show size, length, and type of each weld. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
3. Indicate locations and details of anchorage devices to be embedded in or attached to structure or other construction.
4. Indicate plans and/or elevations showing member locations with all openings larger than 10 inches shown and located.
5. Indicate location of each structural precast concrete unit by same identification mark placed on unit.
6. Indicate relationship of structural precast concrete members to adjacent materials.
7. Estimated cambers for floor slabs receiving cast-in-place topping.
8. Indicate shim sizes and grouting sequence.
9. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, notify the Architect immediately and submit design calculations and drawings. Do not adversely affect the appearance, durability or strength of units when modifying details or materials. Maintain the general design concept when altering size of units and alignment.

D. Provide handling procedures, sequence of erection, and bracing plan.

E. Precast member and connection design signed and sealed by a professional engineer responsible for its preparation and registered in the state in which the project is located.

F. Welding Certificates: Copies of certificates for welding procedure specifications (WPS) and personnel.

G. Qualification Data: For firms and persons specified in "Quality Assurance". Article to demonstrate their capabilities and experience.

H. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.
1. Concrete materials.
2. Reinforcing materials and prestressing tendons.
3. Admixtures.
4. Bearing pads.
5. Structural-steel shapes and hollow structural sections.

1.7 QUALITY ASSURANCE

A. Erector Qualifications: A precast concrete erector Qualified by the Precast/Prestressed Concrete Institute (PCI) prior to beginning work at the jobsite.

B. Fabricator Qualifications: A firm that complies with the following requirements and has a minimum of 5 years experience in producing structural precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.

1. Assumes responsibility for engineering structural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and precast member and connection design by a qualified professional engineer.

2. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of structural precast concrete that are similar to those indicated for this Project in material, design, and extent.

3. Participates in PCI's Plant Certification program at the time of bidding and is designated a PCI-certified plant for Group C or CA, Category 4.

4. Has sufficient production capacity to produce required units without delaying the Work.

C. Testing Agency Qualifications: An independent testing agency may be hired by the Owner, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

D. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, "PCI Design Handbook – Precast and Prestressed Concrete," applicable to

types of structural precast concrete units indicated.

E. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products."
   1. Comply with camber and dimensional tolerances of PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction."

F. Product Options: Drawings indicate size, profiles and dimensional requirements of precast concrete units and are based on the specific types of units indicated. Other fabricators' precast concrete units complying with requirements may be considered. Refer to Division 1 Section "Substitutions."

G. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel"; and AWS D1.4, "Structural Welding Code – Reinforcing Steel."

H. Fire Resistance: Where indicated, provide structural precast concrete units whose fire resistance meets the prescriptive requirements of the governing code or has been calculated according to PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete," and is acceptable to authorities having jurisdiction.

1.8 PRODUCT STORAGE, DELIVERY AND HANDLING

A. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, staining, and to prevent cracking, distortion, warping or other physical damage.

B. Lift and support units only at designated points shown on the Shop Drawings.

C. General Contractor to keep units clean and to provide protection for precast units stored on job and in-place units until final acceptance.

1.9 SEQUENCING

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 – PRODUCTS

2.1 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, nonabsorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and capable of producing required finish surfaces.
   1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Galvanized Reinforcing Bars: ASTM A 615, Grade 60 or ASTM A 706 deformed bars, ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized and chromate wash treated after fabrication and bending.

D. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

E. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

2.3 PRESTRESSING TENDONS

A. Prestressing Strand: ASTM A 416, Grade 270 uncoated, 7-wire, low-relaxation strand.

B. Unbonded Post-tensioning Strand: ASTM A 416 with corrosion inhibitor conforming to ASTM D 1743, Grade 270, 7-wire, low-relaxation strand with polypropylene conduit sheath.

D. Post-tensioning Bars: ASTM A 722, uncoated high strength steel bar.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or III.
   1. For surfaces exposed to view in finished structure, use same type, brand, and mill source throughout the precast concrete production.

   2. Standard gray Portland cement may be used for non-exposed backup concrete.

B. Supplementary Cementitious Materials
   1. Fly Ash Admixture: ASTM C 618, Class C or F.
   2. Metakaolin Admixture: ASTM C 618, Class N.
   3. Silica Fume Admixture: ASTM C 1240 with optional chemical and physical requirements.
   4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse, non-reactive aggregates complying with **Class [4S] [4M] [5S] [5M]**. Provide and stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for entire Project.

D. Backup Concrete Aggregates: ASTM C 33 or C 330.

E. Lightweight Aggregates: Except as modified by PCI MNL 116, ASTM C 330 with

absorption less than 11 percent.

F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with ASTM C 1602/C 1602M and chemical limits of PCI MNL 116.

G. Air Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

H. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing Admixture: ASTM C 1017/C 1017M.
7. Corrosion Inhibiting Admixture: ASTM C 1582/C 1582M

2.6 STEEL CONNECTION MATERIALS AND ACCESSORIES

A. Carbon-Steel Shapes and Plates: ASTM A 36

B. Carbon-Steel Headed Studs: ASTM A 108, Grades 1010 through 1020, cold finished and bearing the minimum mechanical properties for studs as indicated under PCI MNL 116, Table 3.2.3.; AWS D1.1, Type A or B, with arc shields.

C. Carbon-Steel Plate: ASTM A 283.

D. High-Strength, Low-Alloy Structural Steel: ASTM A 572

E. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.

F. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706.

G. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A carbon-steel, hex-head bolts and studs; carbon-steel nuts and flat, unhardened steel washers.

H. Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123, after fabrication, or ASTM A 153 as applicable.

1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.

I. Galvanizing Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20. Comply with manufacturer's requirements for surface preparation.

J. Shop-Primed Finish: Prepare surfaces of nongalvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 1 followed by SSPC-SP 3 and shop-apply according to SSPC-PA 1.

K. Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install structural precast concrete units.

L. Welding Electrodes: Comply with AWS standards.

2.7 BEARING PADS

A. Provide one of the following bearing pads for structural precast concrete units as recommended by precast fabricator for application:

1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore A durometer according to ASTM D 2240, minimum tensile strength 2250 psi (15.5 MPa) per ASTM D 412.
2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Surface hardness of 70 to 90 Shore A durometer. Capable of supporting a compressive stress of 3000 psi (20.7 MPa) with no cracking, splitting or delaminating in the internal portions of the pad. Test one specimen for each 200 pads used in the Project.
3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer. Surface hardness of 80 to 100 Shore A durometer. Conforming to Division II, Section 18.10.2 of AASHTO Standard Specifications for Highway Bridges, or Military Specification, MIL-C-882E.
4. Frictionless Pads: Polytetrafluoroethylene (PTFE), glass-fiber reinforced, bonded to stainless or mild-steel plates, of type required for in-service stress.
5. High-Density Plastic: Multimonomer, nonleaching, plastic strip capable of supporting construction loads with no visible overall expansion.

2.8 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144, or ASTM C 404, with minimum water required for placement and hydration.

B. Non-shrink Grout: Premixed, packaged ferrous and non-ferrous aggregate shrink-resistant grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A of consistency suitable for application with a 30-minute working time.

C. Epoxy-resin grout: Two-component mineral-filled epoxy-resin: ASTM C881/C881M of type,

grade, and class to suit requirements.

2.12 CONCRETE MIXES

A. Prepare design mixes for each type of concrete required.

1. Limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.

B. Design mixes may be prepared by a qualified independent testing agency or by qualified precast plant personnel at structural precast concrete fabricator's option.

C. Normal-Weight Concrete Face and Backup Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): minimum 6000 psi.
2. Release Strength: as required by design.
3. Maximum Water-Cementitious Materials Ratio: 0.40.

D. Lightweight Concrete: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:

1. Compressive Strength (28 Days): minimum 5000 psi.
2. Release Strength: as required by design.
3. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu.ft., plus or minus 3 lb/cu.ft., according to ASTM C 567.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.

G. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.

H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.14 FORM FABRICATION

A. Form: Accurately construct forms, mortar tight, of sufficient strength to withstand pressures due to concrete-placement and vibration operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of forms with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

B. Maintain forms to provide completed structural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished work.
2. Edge and Corner Treatment: Uniformly chamfered or as built in on standard forms.

2.17 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement. Do not relocate bearing plates in units unless approved by Architect.

1. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1/ D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in structural precast concrete units as indicated on Contract Drawings.

D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Engineer's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy coated reinforcing exceeds limits specified in ASTM A 775/A 775M repair with patching material compatible with coating material.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Locate and support reinforcement by metal or plastic chairs, runners, bolsters, spacers, hangers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to PCI MNL 116.
3. Place reinforcing steel and prestressing tendon to maintain a minimum 3/4 –inch (19 mm) concrete cover. Increase cover requirements in accordance with ACI 318 when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
4. Install welded wire fabric in lengths as long as practicable. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Reinforce structural precast concrete units to resist handling, transportation, and erection stresses.

G. Prestress tendons for structural precast concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.

H. Comply with requirements in PCI MNL 116 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

I. Place concrete in a manner to prevent seams or planes of weakness from forming in precast concrete units.
   1. Place backup concrete to ensure bond with face mix concrete.

K. Thoroughly consolidate placed concrete by internal and/or external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.

   1. Place self-consolidating concrete without vibration in accordance with PCI TR-6 "Interim Guidelines for the Use of Self-Consolidating Concrete."

L. Comply with PCI MNL 116 procedures for hot and cold-weather concrete placement.

M. Identify pickup points of precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast concrete unit on a surface that will not show in finished structure.

N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until the compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

2.18 FABRICATION TOLERANCES

A. Fabricate structural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 or PCI MNL 135 product tolerances as well as position tolerances for cast-in items.

2.19 FINISHES

A. Commercial (Structural) Finishes
   1. Commercial Grade: Remove large fins and protrusions and fill large holes. Rub or grind ragged edges. Faces are to be true, well-defined surfaces. Air holes, water marks, and color variations are acceptable. Allowable form joint offsets are limited to 3/16 in.
   2. Standard Grade: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are acceptable. Fill air holes greater than 1/4 inch in width that occur in high concentration (more than one per 2 $in.^2$). Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Allowable for joint offset limited to 1/8 inch.
   3. Grade B Finish: Fill air pockets and holes larger than 1/4 inch in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than 1/8 inch in width that

occur in high concentration (more than one per 2 in.^{2}). Grind smooth form offsets or fins larger than 1/8 inch. Repair surface blemishes due to holes or dents in forms. Discoloration is permitted at form joints.

B. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish, float finish, if required. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. No major imperfections, honeycombing, or defects are permitted.

C. Smooth steel-trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float and trowel to a smooth, uniform finish.

D. Apply roughened surface finish in accordance with ACI 318 (ACI 318M) to precast concrete units that will receive concrete topping after installation.

2.21 SOURCE QUALITY CONTROL

A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 116 requirements. If using self-consolidating concrete also test and inspect according to PCI TR-6 "Interim Guidelines for the Use of Self-Consolidating Concrete."

B. In addition to PCI Certification, Owner may employ an independent testing agency to evaluate structural precast concrete fabricator's quality-control and testing methods.

1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.

C. Precast concrete units will be considered deficient if units fail to comply with ACI 318 (ACI 318M) strength requirements.

D. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, Precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.

E. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mix that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

F. Defective Work: Structural precast concrete units that do not comply with acceptability requirements in PCI MNL 116, including concrete strength, manufacturing tolerances, and color and texture range are unacceptable. Chipped, spalled or cracked units may be repaired. The Architect reserves the right to reject any unit if it does not match the accepted samples. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 – EXECUTION

3.1 PREPARATION

A. Deliver anchorage devices that are embedded in or attached to the building structural frame or foundation before start of such work. Provide locations, setting diagrams, and templates for the proper installation of each anchorage device.

3.2 EXAMINATION

A. Examine supporting structure or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance.

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

3.3 ERECTION

A. Install loose clips, hangers, bearing pads, and other accessories required for connecting structural precast concrete units to supporting members and backup materials.

B. Erect precast concrete level, plumb and square within the specified allowable tolerances. Provide temporary structural framing, supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

1. Install temporary steel or plastic spacing shims or bearing pads as precast concrete units are being erected. Tack-weld steel shims to each other to prevent shims from separating.
2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
3. Remove projecting lifting devices and use sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast concrete surfaces when recess is exposed.
4. Provide and install headers of cast-in-place concrete or structural-steel shapes for openings larger than one slab width according to hollow-core slab unit fabricator's written recommendations.

C. Connect structural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on approved Erection Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and/or grouting is completed.

D. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 requirements for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

1. Protect structural precast concrete units and bearing pads from damage by field welding or cutting operations and provide noncombustible shields as required.
2. Clean weld affected metal surfaces with chipping hammer followed by brushing, and apply a minimum 0.004 inch (100 µm) thick coat of galvanized repair paint to galvanized surfaces in conformance with ASTM A 780.
3. Clean weld affected metal surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces in accordance with manufacturer's recommendations.
4. Visually inspect all welds critical to precast connections. Visually check all welds for completion and remove, reweld or repair all defective welds, if services of AWS-certified welding inspector are not furnished by Owner.

E. At bolted connections, use lock washers or other approved means to prevent loosening of nuts

after final adjustment.

1. Where slotted connections are used, check bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connection, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.

F. Grouting or Dry Packing Connections and Joints: Erection drawings shall indicate joints to be grouted and any critical grouting sequences. Grout open spaces at keyways, connections and joints where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Fill joints completely without seepage to other surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

G. Field cutting of precast units is not permitted without approval of the Engineer.

H. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units unless approved by Engineer.

3.4 ERECTION TOLERANCES

A. Erect structural precast concrete units level, plumb, square, true, and in alignment without exceeding the non-cumulative erection tolerances of PCI MNL 135. Level out variations between adjacent members by jacking, loading, or any other feasible method as recommended by the manufacturer and acceptable to the Architect.

3.5 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections.

B. Field welds will be subject to visual inspections and non-destructive testing in accordance with ASTM E 165 or ASTM E 709.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Repair or remove and replace work that does not comply with specified requirements.

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

3.6 REPAIRS

A. Repairs will be permitted provided structural adequacy, serviceability and durability of units and appearance are not impaired.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged structural precast concrete units that cannot be repaired.

3.7 CLEANING

A. Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.

B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION

SECTION 03 45 00 - PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Insulated, architectural precast concrete units.

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for installing connection anchors in concrete.
2. Section 05 12 00 "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Detail fabrication and installation of architectural precast concrete units.
2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
4. Indicate details at building corners.
5. Indicate separate face and backup mixture locations and thicknesses.
6. Indicate type, size, and length of welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.

8. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
9. Include plans and elevations showing unit location and sequence of erection for special conditions.
10. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
11. Indicate relationship of architectural precast concrete units to adjacent materials.
12. Indicate locations, dimensions, and details of thin-brick units, including corner units and special shapes, and joint treatment.
13. Indicate locations, dimensions, and details of stone facings, anchors, and joint widths.
14. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

C. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.

1. After the mix and finish is approved, a min. 16 SF mock-up panel must be submitted for approval that incorporates typical panel detailing. Also (3) 16 SF range samples must be submitted for approval of color and texture range. The mockup panel shall be installed on site and incorporate all the colors/textures/surface treatments that are on the project. See Bid Set for mockup elevation.

2. When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.
3. Samples for each thin-brick unit required, showing full range of color and texture expected. Include Sample showing color and texture of joint treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Material Certificates: For the following items:

1. Cementitious materials.
2. Reinforcing materials and prestressing tendons.
3. Thin-brick units and accessories.
4. Insulation.
5. Wythe Connectors
6. Form Liner

C. Material Test Reports: For aggregates.

1.6 QUALITY ASSURANCE

A. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.7 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground or other re-handling.

B. Support units during shipment on non-staining shock-absorbing material.

C. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

D. Place stored units so identification marks are clearly visible, and units can be inspected.

E. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

F. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design architectural precast concrete units.

B. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

C. Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:

1. Design precast concrete units and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements as follows:

a. Upward and downward movement of 1/2 inch.

2. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of 120 deg F.

2.2 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

2.3 REINFORCING MATERIALS

A. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.

1. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source. The face mix shall be per Architect's approved sample.

B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33/C 33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.

a. Gradation: Uniformly graded Gap graded to match design reference sample.

2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.

C. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

2.5 INSULATED PANEL ACCESSORIES

A. Extruded-Polystyrene (XPS) Board Insulation: ASTM C 578, Type X, 1.30 lb/cu. ft. Type IV, 1.55 lb/cu. ft. Type VI, 1.80 lb/cu. ft. Type VII, 2.20 lb/cu. ft. Type V, 3.00 lb/cu. ft.; square edges; with thickness of 3" (R-15) minimum.

B. Wythe Connectors shall be non-metallic.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Use a single design mixture for units with more than one major face or edge exposed.
2. Where only one face of unit is exposed use either a single design mixture or separate mixtures for face and backup.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.

C. Approved Concrete mix shall be Coreslab Mix #27 – Light Acid Etch U.N.O. Sample shall be approved by the Architect prior to fabrication.

D. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.

E. Normal-Weight Concrete Mixtures: Proportion face mixtures face and backup mixtures full-depth mixture face and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi minimum.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.

2.7 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished work.
2. Edge and Corner Treatment: Uniformly chamfered radiused.
3. Form Liner – Reynold #718 by www.apformliner.com

2.8 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C. Cast-in slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.

F. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

G. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

H. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

I. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

1. Place backup concrete mixture to ensure bond with face-mixture concrete.

J. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.

1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.

K. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

L. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.

M. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

N. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.9 INSULATED PANEL CASTING

A. Cast, screed, and consolidate bottom concrete wythe supported by mold.

B. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation holes, and consolidate concrete around connectors according to connector manufacturer's written instructions.

C. Ensure bottom wythe and insulation layer are not disturbed after bottom wythe reaches initial set.

D. Cast, screed, and consolidate top wythe to meet required finish.

E. Maintain temperature below 150 deg F in bottom concrete wythe.

2.10 FABRICATION TOLERANCES

A. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.

1. Weld Plates: Plus or minus 1 inch.
2. Inserts: Plus or minus 1/2 inch.
3. Handling Devices: Plus or minus 3 inches.
4. Location of Rustication Joints: Plus or minus 1/8 inch.
5. Location of Opening within Panel: Plus or minus 1/4 inch.
6. Electrical Outlets, Hose Bibs: Plus or minus 1/2 inch.
7. Location of Bearing Surface from End of Member: Plus or minus 1/4 inch.
8. Allowable Rotation of Plate, Channel Inserts, and Electrical Boxes: 2-degree rotation or 1/4 inch maximum over the full dimension of unit.
9. Position of Sleeve: Plus or minus 1/2 inch.

B. Thin-Brick-Faced Architectural Precast Concrete Units: Restrict the following misalignments to 2 percent of number of thin bricks in a unit.

1. Alignment of Mortar Joints:

    a. Jog in Alignment: 1/8 inch.
    b. Alignment with Panel Centerline: Plus or minus 1/8 inch.

2. Variation in Width of Exposed Mortar Joints: Plus or minus 1/8 inch.
3. Tipping of Individual Thin Bricks from the Panel Plane of Exposed Thin-Brick Surface: Plus 0 inch; minus 1/4 inch less than or equal to depth of form liner joint.
4. Exposed Thin-Brick Surface Parallel to Primary Control Surface of Panel: Plus 1/4 inch; minus 1/8 inch.
5. Individual Thin-Brick Step in Face from Panel Plane of Exposed Thin-Brick Surface: Plus 0 inch; minus 1/4 inch less than or equal to depth of form liner joint.

2.11 FINISHES

A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Approved architectural precast mix (Coreslab Mix #27) and a light acid etch finish, per approved sample.

B. Finish exposed top and back surfaces of architectural precast concrete units with a machine trowel finish.

C. Finish unexposed surfaces of architectural precast concrete units with a smooth, 2-pass hard steel trowel finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.

B. Do not install precast concrete units until supporting cast-in-place concrete has attained minimum allowable design compressive strength and supporting steel or other structure is structurally ready to receive loads from precast concrete units.

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

3.2 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

1. Install temporary steel or plastic spacing shims as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
4. Unless otherwise indicated, maintain uniform joint widths of 3/4 inch.

C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

1. Do not permit connections to disrupt continuity of roof flashing.

D. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

1. Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
2. Welds not specified shall be continuous fillet welds, using no less than the minimum fillet as specified by AWS.

3. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780/A 780M.
4. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
5. Visually inspect welds and remove, reweld, or repair incomplete and defective welds.

E. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot.
2. For slip-critical connections, use one of the following methods to assure proper bolt pretension:

a. Turn-of-Nut: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
b. Calibrated Wrench: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
c. Twist-off Tension Control Bolt: ASTM F 1852.
d. Direct-Tension Control Bolt: ASTM F 1852.

3. For slip-critical connections, use method and inspection procedure approved by Architect and coordinated with inspection agency.

3.3 REPAIRS

A. Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.

C. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.4 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 03 45 00

SECTION 03 60 00 — EPOXY GROUT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish labor and materials to install epoxy grout as shown or implied by the Contract Documents.
2. Furnish labor and materials necessary to grout anchor bolts and reinforcing bars into existing concrete and to patch existing concrete at equipment anchorages.
3. Furnish labor and materials to patch and repair existing concrete.
4. Furnish labor and materials to repair new construction as required by field errors or omissions.

B. Related Sections:

1. Division 03 Section: Concrete Formwork
2. Division 03 Section: Concrete Reinforcement
3. Division 03 Section: Grouting
4. Division 05 Section: Structural Steel Framing

1.2 QUALITY ASSURANCE

A. Codes and Standards:

1. Repairing concrete with epoxy grout and epoxy mortars shall conform to all requirements of Standard Specification for Repairing Concrete with Epoxy Mortars (ACI 503.4-Latest Edition), publishing by the American Concrete Institute, Detroit Michigan, except as modified by the requirements of this project specification.

1.3 SUBMITTALS

A. Before any of the materials of this Section are delivered to the job site, submit product literature to the Architect/ Engineer in accordance with Division 01 Section: Submittal Procedures of these Specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Reference Standard: Provide products manufactured by the following:

1. Sika Corporation

2.2 PRODUCTS

A. Epoxy Grout for Grouting Anchor Bolts or Concrete Patching Mortar (when mixed with recommended aggregate):

1. For overhead installations:

   a. Sika Corporation; Sikadur 35, Hi-Mod LV
   b. Simpson Strong-Tie Company, Inc.; FX-763
   c. BASF Corporation Building Systems; MasterEmaco ADH 327RS

2. For non-overhead installations:

   a. Laticrete International, Inc.; Spectralock Pro

   b. Laticrete International, Inc.; Sprectralock 2000 IG

   c. Sika Corporation; Sikadur 31 Hi-Mod Gel

3. Adhesive anchors:

   1) HIT-RE 500 V3; Hilti Inc.
   2) HIT-HY 200; Hilti, Inc.
   3) HIT-HY 70; Hilti, Inc.
   4) Epcon System; ITW Red Head
   5) Pure 110+; Powers Fasteners, Inc.

4. Due to the large number of different applications and field conditions, additional products may be required by the Architect/Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Surface Preparation:

1. Surfaces of existing concrete shall be dry and structurally sound prior to grouting.
2. The surfaces of concrete at the perimeter of openings, which will be in contact with the grout fill, shall be cleaned. Remove dirt, oil, grease, and other foreign matter.
3. Apply cleaning agent, lacquer thinner by means which will not allow spillage and dripping on existing facilities below.
4. Existing steel reinforcing shall be cleaned by wire brush or by sand blasting, or needle gun, with all loose or damaged material removed.

3.2 INSTALLATION

A. Preparation:

1. Form to lines and elevations indicated or required such that adequate anchorage and bearing is provided.

B. Application:

1. Apply grout in accordance with the manufacturer's recommendations. Thoroughly pack forms to minimize shrinkage.
2. Rodding may be required to eliminate voids, honeycombing, and similar defects. Consult manufacturer.
3. Finished installation shall be tight, neat, smooth, and flush with adjoining surfaces and shall be thoroughly bonded thereto.
4. Loose, spalled, cracked, or otherwise defective material will be rejected.
5. Application by trowel is acceptable when forming is impractical or impossible.
6. Notify engineer of proposed method of installation prior to commencement of work.
7. When repairing existing concrete, restore original concrete size and shape with new material.
8. Avoid feathered edges by undercutting edges at sides of patches.
9. Notify engineer of any crack suspected of being a "working joint" prior to patching.

C. Curing:

1. Protect and cure grout in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 03 60 01 – GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install all grout as indicated or implied by the Contract Documents.

B. Related Sections:

1. Division 03 Section: Cast-in-Place Concrete
2. Division 05 Section: Structural Steel Framing

1.2 DELIVERY AND STORAGE

A. Prevent damage to or contamination of non-shrink grouting materials during delivery, handling, and storage.

B. Store all non-shrink grouting materials in undamaged condition with package labels and seals intact.

1.3 SUBMITTALS

A. Product Literature:

1. Submit sufficient data regarding installation methods and compression strength.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metallic Non-Shrink Non-Catalyzed Mortar: ASTM C1107

1. Reference Standard: BASF Corporation Building Systems; MasterFlow 885
2. General use: precision grouting of equipment.
3. All grout subject to fatigue

B. Non-Metallic Non-Shrink Cementitious Grout: ASTM C1107

1. Reference Standard: BASF Corporation Building Systems; MasterFlow 713
2. General use: Precision grouting of structure or building systems.
3. If grout is subject to fatigue, use metallic grout.

C. Latex Modified Concrete: ASTM C1059

1. Standard: Latex.

a. Acrylic Additive: BASF Construction Chemicals, LLC: Thoro Acryl 60

b. Standard: Concrete.

c. Per Cast-in-Place Concrete section of this Specification

2. General use: Patching large holes and areas

3. Submit mix design.

D. Pre-Mixed Repair Mortar or Gel:

1. Vertical and horizontal surfaces:

a. Sika Corporation; Sikatop 122 Plus

2. Overhead surfaces:

a. Sika Corporation; Sikatop 123 Plus

3. General use: Fill large cracks and reform lines of beams, columns, or walls in areas too small to form.

E. Portland Cement:

1. ASTM C150, Type I or III

F. Sand:

1. ASTM C33, fine aggregate

G. Water:

1. Potable

2.2 MIXES

A. Follow manufacturer's recommendations for grout mixing.

B. Use minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding.

2.3 MIXING

A. Mix non-shrink grout materials in water in a mechanical mixer for no less than 5 minutes.

B. Do not retemper grout or add more water for any reason.

PART 3 - EXECUTION

3.1 INSTALLATIONS

A. Thoroughly clean all surfaces with which grout will be in contact free from dirt, grease, rust, and other deleterious substances. Form to lines and elevations indicated or required such that adequate bearing for structural elements is provided.

B. Apply non-shrink grout immediately after mixing. Thoroughly pack forms to minimize shrinkage. Rodding is required to eliminate all voids, honeycombing and similar defects. Cure grout as recommended by manufacturer. Finished installation shall be tight, neat, smooth, and flush with adjoining surfaces and shall be thoroughly bonded thereto. Loose, spalled, cracked, or otherwise defective material will be rejected.

3.2 SURFACE PREPARATION

A. Remove all defective concrete, laitance, dirt, oil, grease, and other foreign material from concrete surfaces. Clean all steel surfaces.

B. Lightly roughen concrete surfaces.

C. Align, level, and maintain final positioning of all components.

D. Saturate all concrete surfaces with clean water, remove excess water. Leave no standing water.

E. Take special precautions during extreme weather conditions according to manufacturer's written instructions.

3.3 PLACING GROUT

A. Select material in accordance with manufacturer's recommendation.

B. Place non-shrink grouting material quickly and continuously.

C. Apply grout from one side only to avoid air pockets.

D. If shims are used, do not remove for at least 48 hours after grout has been placed. After removal of shims, fill voids with plain cement-sand grout.

3.4 PLACEMENT OF LATEX MODIFIED CONCRETE

A. Chip substrate as required to expose fresh clean material.

B. Chip edges of voids so as not to produce feathered edges.

C. Mix per submitted mix design with clean uncontaminated containers and tools. Thoroughly mix material. Place and vibrate as required to produce uniform void-free mix.

D. Protect uncured material from detrimental environmental conditions.

3.5 PLACEMENT OF PREMIXED REPAIR MORTAR OR GEL

A. Mix per manufacturer's instructions.

B. Chip substrate as required to expose fresh clean material.

C. Chip edges of voids so as to not produce feathered edges.

D. Install per manufacturer's instructions.

3.6 CURING

A. Cure grout for 3 days after placing by keeping work wet and covered.

END OF SECTION

SECTION 03 62 00 - NON-SHRINK GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install all grout as indicated or implied by the Contract Documents.

B. Related Sections:

1. Division 03 Section: Cast-in-Place Concrete
2. Division 05 Section: Structural Steel Framing

1.2 DELIVERY AND STORAGE

A. Prevent damage to or contamination of non-shrink grouting materials during delivery, handling, and storage.

B. Store all non-shrink grouting materials in undamaged condition with package labels and seals intact.

1.3 SUBMITTALS

A. Product Literature:

1. Submit sufficient data regarding installation methods and compression strength.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metallic Non-Shrink Non-Catalyzed Mortar: ASTM C1107

1. Standard: BASF Corporation Building Systems; MasterFlow 885
2. General use: precision grouting of equipment, structure, or building systems.
3. All grout subject to fatigue.

B. Non-Metallic Non-Shrink Cementitious Grout: ASTM C1107

1. Standard: BASF Corporation Building Systems; MasterFlow 713

2. General use: Precision grouting of equipment, structure, or building systems.

3. If grout is subject to fatigue, use metallic grout.

C. Latex Modified Concrete: ASTM C1059.

1. Standard: Latex.

a. Acrylic Additive: BASF Construction Chemicals, LLC: Thoro Acryl 60Standard: Concrete

2. General use: Patching large holes and areas.
3. Submit mix design.

D. Pre-mixed Repair Mortar or Gel:

1. Vertical and horizontal surfaces:

a. Sika Corporation; Sikatop 122 Plus

2. Overhead surfaces:

a. Sika Corporation; Sikatop 123 Plus

3. General use: Fill large cracks and reform lines of beams, columns, or walls in areas too small to form.

E. Portland Cement:

1. ASTM C150, Type I or III

F. Sand:

1. ASTM C33, fine aggregate

G. Water:

1. Potable

2.2 MIXES

A. Description:

1. Follow manufacturer's recommendations for grout mixing.
2. Use minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding.
3. Portland cement mortar for raked-out edges of non-shrink grout:

a. One (1) part Portland cement, two (2) parts sand, 0.50 parts water by weight.

2.3 MIXING

A. Procedures:

1. Mix non-shrink grout materials in water in a mechanical mixer for no less than 5 minutes.
2. Do not retemper grout or add more water for any reason.

PART 3 - EXECUTION

3.1 INSTALLATIONS

A. Description:

1. Thoroughly clean all surfaces with which grout will be in contact free from dirt, grease, rust, and other deleterious substances. Form to lines and elevations indicated or required such that adequate bearing for structural elements is provided.
2. Apply non-shrink grout immediately after mixing. Thoroughly pack forms to minimize shrinkage. Rodding is required to eliminate all voids, honeycombing and similar defects. Cure grout as recommended by manufacturer. Finished installation shall be tight, neat, smooth, and flush with adjoining surfaces and shall be thoroughly bonded thereto. Loose, spalled, cracked, or otherwise defective material will be rejected.

3.2 SURFACE PREPARATION

A. Description:

1. Remove all defective concrete, laitance, dirt, oil, grease, and other foreign material from concrete surfaces. Clean all steel surfaces.
2. Lightly roughen concrete surfaces.
3. Align, level, and maintain final positioning of all components.
4. Take special precautions during extreme weather conditions according to manufacturer's written instructions.
5. Saturate all concrete surfaces with clean water, remove excess water. Leave no standing water.

3.3 PLACING GROUT

A. Description:

1. Plan material in accordance with manufacturer's recommendation.
2. Place non-shrink grouting material quickly and continuously.
3. Apply grout from one side only to avoid air pockets.

4. If shims are used, do not remove for at least 48 hours after grout has been placed. After removal of shims, fill voids with plain cement-sand grout.
5. After non-shrink grout has reached initial set, rake out exposed edges approximately 1 inch and point with Portland cement mortar.

3.4 PLACEMENT OF LATEX MODIFIED CONCRETE

A. Description:

1. Chip substrate as required to expose fresh clean material.
2. Chip edges of voids so as not to produce feathered edges.
3. Mix per submitted mix design with clean uncontaminated containers and tools. Thoroughly mix material. Place and vibrate as required to produce uniform void-free mix.
4. Protect uncured material from detrimental environmental conditions.

3.5 PLACEMENT OF PREMIXED REPAIR MORTAR OR GEL

A. Description:

1. Mix per manufacturer's instructions.
2. Chip substrate as required to expose fresh clean material.
3. Chip edges of voids so as to not produce feathered edges.
4. Install per manufacturer's instructions.

3.6 CURING

A. Description:

1. Cure grout for 3 days after placing by keeping work wet and covered.

END OF SECTION

SECTION 04 20 00 - UNIT MASONRY ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes concrete masonry units; reinforcement, anchorage, and accessories.

1.2 REFERENCES

A. American Society for Testing and Materials:
   1. ASTM A153/A153M - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   2. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   3. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
   4. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   5. ASTM A951 - Standard Specification for Masonry Joint Reinforcement.
   6. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
   7. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
   8. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
   9. ASTM C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.
   10. ASTM C212 - Standard Specification for Structural Clay Facing Tile.
   11. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).

B. American Concrete Institute:
   1. ACI 530 – Building Code Requirements for Masonry Structures.
   2. ACI 530.1 – Specification for Masonry Structures.

C. The Masonry Society
   1. TMS MSJC - Building Code for Masonry Structures (ACI 530/ASCE 5), Specification for Masonry Structures (TMS 602/ACI 530.1/ASCE 6) and Commentaries.

1.3 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following net-area compressive strength (f'm) at 28 days. Determine compressive strength on masonry by testing masonry prisms according to ASTM C1314.
   1. For Concrete Unit Masonry: f'm = 2000 p.s.i.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal requirements.

B. Product Data: Submit data for decorative masonry units and fabricated wire reinforcement, wall ties, anchors and other accessories.

C. Samples: Submit two samples of face brick, units to illustrate color, texture and extremes of color range.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

E. Test Reports: Submit test results indicating compressive strength, water absorption, saturation and suction.

F. Shop drawings: Show fabrication and installation details for following:
   1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Detail and Detailing of Concrete Reinforcement." Show elevation of each reinforced walls.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with TMS MSJC Code and TMS MSJC Specification.

B. Fire Performance Characteristics: Where fire-resistance ratings are indicated, provide materials and construction which are identical to those of assemblies who fire endurance has been determined by testing in compliance with ASTM E119 by a recognized testing and inspecting organization or by another means, as acceptable to authorities having jurisdiction.

C. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 MOCKUP

A. Section 01400 - Quality Requirements: Mockup requirements.

B. Construct cavity masonry wall mockup, 8 feet long by 6 feet high, including masonry, mortar and accessories, structural backup, flashings, wall insulation and weeps.

C. Locate where directed at the project site.

D. Incorporate accepted mockup as part of Work.

1.8 PRE-INSTALLATION MEETINGS

A. Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Cold Weather Requirements: TMS 602 MDJC Specifications.

C. Cold Weather Preparation
1. Do not lay masonry units having temperature below 20 degree F or having frozen moisture, visible ice, or snow on their surface.
2. Remove visible ice and snow from the top surface of existing foundation and masonry to receive new construction. Heat these surfaces above freezing, using methods that do not result in damage.

C. Cold Weather Construction: Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 degrees F.

1. 40 degrees F to 32 degrees F:
   a. Mortar: Heat mixing water to produce mortar temperature between 40 degrees F and 120 degrees F.
   b. Grout: Follow normal masonry procedures.

2. 32 degrees F to 25 degrees F:
   a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F and 120 degrees F; maintain temperature of mortar on boards above freezing.
   b. Grout: Heat grout materials to 90 degrees F to produce in-place grout temperature of 70 degrees F at end of work day.

3. 25 degrees F to 20 degrees F:
   a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F and 120 degrees F; maintain temperature of mortar on boards above freezing.
   b. Grout: Heat grout materials to 90 degrees F to produce in-place grout temperature of 70 degrees F at end of work day.

c. Heat both sides of walls under construction using salamanders or other heat sources.
d. Use windbreaks or enclosures when wind is in excess of 15 mph.

4. 20 degrees F and below:
   a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F and 120 degrees F:
   b. Grout: Heat grout materials to 90 degrees F to produce in-place grout temperature of 70 degrees F at end of work day.
   c. Masonry Units: Heat masonry units so that they are above 20 degrees F at time of laying.
   d. Provide enclosure and auxiliary heat to maintain an air temperature of at least 40 degrees F for 24 hours after laying units.
   e. Do not heat water for mortar and grout to above 160 degrees F.

D. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry temperature ranges apply to anticipated minimum night temperatures.

1. 40 degrees F to 32 degrees F:
   a. Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

2. 32 degrees F to 25 degrees F:
   a. Completely cover masonry with weather-resistive membrane for at least 24 hours.

3. 25 degrees F to 20 degrees F:
   a. Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.

4. 20 degrees F and below:
   a. Except as otherwise indicated, maintain masonry temperature above 32 degrees F for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40 degrees F for 48 hours.

1.11 PROJECT CONDITIONS

A. Projection of Masonry: During construction, cover tops of walls, projections and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   2. Where on wythe of multwythe masonry walls is completed in advance of other wythe, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for a least 12 hours and concentrated loads for Least 3 days after building masonry walls or columns.

1.12 COORDINATION

A. Administrative Requirements: Coordination and project conditions.

B. Coordinate masonry work with installation of window and door anchors.

1.13 EXTRA MATERIALS

A. Section 01700 - Execution Requirements: Spare parts and maintenance products.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Hollow Load Bearing Concrete Masonry Units (CMU): ASTM C90, normal weight.

B. Concrete Masonry Unit Size and Shape: Nominal modular size (width) as indicated on the Drawings. Furnish special units for 90 degree corners, bond beams, lintels, bullnosed corners. Provide bullnose units for outside corner, unless otherwise indicated.

2.2 LINTELS

A. Build-In-Place Masonry Lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place lintels until cured.

B. Steel Lintels: Sizes as indicated on the drawings, hot-dip galvanized.

2.3 ACCESSORIES

A. Single Wythe Joint Reinforcement: ASTM A951, Ladder type; steel wire; 0.188 inch diameter side rods with 0.148 inch diameter cross ties hot dip galvanized to ASTM A641 (0.1oz/sqft) after fabrication for interior masonry and hot dip galvanized to ASTM A153 (1.5oz/sqft) for exterior walls.

B. Multiple Wythe Joint Reinforcement: ASTM A951; ladder type; adjustable type, 0.188 inch diameter side rods with 0.148 inch diameter cross ties; hot dip galvanized to ASTM A153 (1.5oz/sqft) after fabrication. Number of side rods to match the number of mortar bed joints.

C. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, uncoated finish.

D. Strap Anchors: bent steel shape, as detailed on drawings, hot dip galvanized to ASTM A153 B.

E. Wall Ties (CMU Back-up): Formed steel wire, 0.148 inch diameter, adjustable, eye and pintle type, hot dip galvanized to ASTM A153(1.5oz/sqft).

F. Wall Ties (Frame Back-up): Formed steel wire, 12 gage, with tab plates galvanized to ASTM A153 finish. Plates secured to substrate with corrosion resistant screws as recommended by the Manufacturer.

G. Anchor Bolts: Headed, J-shaped or L-shaped. Complete with washers and heavy hex nuts; galvanized finish.

H. Mortar and Grout: As specified in Section 04065.

I. Preformed Control Joints: Rubber, Neoprene or Polyvinyl chloride material. Furnish with corner and tee accessories, heat or cement fused joints.

J. Joint Filler: Closed cell polyethylene ; oversized 50 percent to joint width; self expanding; maximum lengths.

K. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Administrative Requirements: coordination and project conditions.

B. Verify field conditions are acceptable and are ready to receive work.

C. Verify items provided by other sections of work are properly sized and located.

D. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other sections.

B. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.

3.3 INSTALLATION

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.

C. Coursing of Concrete Masonry Units:
   1. Bond: Running. Unless Stacked is indicated.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave typical; Flush where a direct applied finish occurs other than paint.

D. Coursing of Decorative Units:
   1. Bond: Stacked. Unless otherwise indicated.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

E. Placing And Bonding:
   1. Lay solid masonry units in full bed of mortar, with full head joints.
   2. Lay hollow masonry units with face shell bedding on head and bed joints.
   3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
   4. Remove excess mortar as work progresses.
   5. Interlock intersections and external corners.
   6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace in fresh mortar.
   7. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
   8. Cut mortar joints flush where wall tile is scheduled.
   9. Isolate masonry from vertical structural framing members with movement joint.
   10. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler.

F. Joint Reinforcement And Anchorage - Single Wythe Masonry:
   1. Install horizontal joint reinforcement 16 inches oc., unless otherwise indicated.
   2. Install horizontal joint reinforcement 8 inches oc., at parapet walls
   3. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
   4. Place joint reinforcement continuous in first and second joint below top of walls.
   5. Lap joint reinforcement ends minimum 6 inches.
   6. Reinforce joint corners and intersections with strap anchors 16 inches oc.

G. Lintels:
   1. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
   2. Maintain minimum required bearing on each side of opening. Refer to Lintel Schedule on the Drawings for bearing length and reinforcement.
   3. Do not splice reinforcing bars.
   4. Support and secure reinforcing bars from displacement.
   5. Place consolidate grout fill without displacing reinforcing.

6. Allow masonry lintels to attain specified strength before removing temporary supports.

H. Grouted Components:
1. Reinforce bond beam with 2 No. 5 bars, 2 inch from bottom web.
2. Reinforce pilaster with bars, as detailed on the drawings.
3. Lap splices bar diameters required by TMS MSJC Code.
4. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch dimensional location.
5. Place and consolidate conventional grout fill by mechanical vibration without displacing reinforcing. Reconsolidated grout by mechanical vibration after initial settlement. Self-consolidating grout is not required to be consolidated.
6. At bearing locations, fill masonry cores with grout for required bearing, both sides of opening; refer to the lintel schedule on the Drawings.

I. Reinforced Masonry:
1. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
2. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward.
3. Place reinforcement bars as indicated on Drawings.
4. Splice reinforcement as indicated.
5. Support and secure reinforcement from displacement.
6. Place and consolidate conventional grout fill by mechanical vibration without displacing reinforcing. Reconsolidated grout by mechanical vibration after initial settlement. Self-consolidating grout is not required to be consolidated.
7. Place grout in accordance with TMS MSJC Specification.

J. Control And Expansion Joints:
1. Do not continue horizontal joint reinforcement through control and expansion joints.
2. Install control and expansion joints at the following maximum spacings, unless otherwise indicated on Drawings:
   a. Exterior Walls: 20 feet on center and within 24 inches on one side of each interior and exterior corner.
   b. Interior Walls: 30 feet on center.
   c. At changes in wall height.
3. Install preformed control joint device in continuous lengths. Seal butt and corner joints.
4. Size control joint in accordance with Section 07900 for sealant performance.
5. Form expansion joint by omitting mortar and cutting unit to form open space.

K. Built-In Work:
1. As work progresses, install built-in metal door and glazed frames, fabricated metal frames, window frames, anchor bolts, and other items to be built-in the work and furnished by other sections.
2. Install built-in items plumb and level.
3. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout or mortar. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
4. Do not build in materials subject to deterioration.

L. Cutting And Fitting:
   1. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.
   2. Obtain Architect/Engineer's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances for appearance other per TMS 602. Maximum Variation From Alignment of Columns and Pilasters: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Joint Thickness: Plus or Minus 1/8 inch for bed joints; minus 1/4 inch and plus 3/8 inch for head joint.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 – Quality Requirements: Testing and Inspection Services.

B. Brick Units: Test each type in accordance with ASTM C67, 5 random units for each 50,000 units installed.

C. Concrete Masonry Units: Test each type in accordance with ASTM C140.

D. Prism test method: Test each type in accordance with ASTM C1314.
   1. Test Frequency: Test and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.
   2. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28days.

3.6 CLEANING

A. Section 01 70 00 - Execution Requirements: Final cleaning.

B. Remove excess mortar and mortar smears as work progresses.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.

END OF SECTION

SECTION 05 12 00 — STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. All structural steel framing, including connections and accessories, as shown or implied by the Contract Documents.

B. Related Sections:

1. Division 03 Section: Grouting
2. Division 05 Section: Steel Roof Decking
3. Division 05 Section: Composite Metal Decking

C. Allowances: Provide the following under the allowances indicated as specified in Division 01–Allowances:

1. Structural Steel Allowance: include an Allowance of **<___>** tons of structural steel for use as directed by the Architect/Engineer. Allowance shall include costs for the following:

a. Furnishing the quantity of steel indicated in the sizes selected by the Architect/Engineer.
b. Shop drawing preparation for additional material.
c. Fabrication of steel, ready for installation on site.
d. Priming of steel members.
e. Delivery to site and erection in location directed by Architect/Engineer.
f. Required bolts, welding supplies, shims, and miscellaneous materials or erection aids required for a complete installation.

1.2 QUALITY ASSURANCE

A. Qualifications of Suppliers and Personnel:

1. The steel fabricator and erector shall have successfully completed work of this type and scope. The fabrication facility shall be certified as an AISC Category I facility.
2. All welding shall be performed by operators who have been recently qualified as prescribed in "Structural Welding Code" of the American Welding Society (except for welds which do not carry calculated stress).

B. Codes and Standards:

1. In addition to complying with all pertinent codes and regulations, comply with:

2. "Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction
3. "Structural Welding Code" of the American Welding Society
4. "Code of Standard Practice for Steel Buildings and Bridges" of the American Institute of Steel Construction.

C. Conflicting Requirements:

1. In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or this Section of the Project Manual, the provisions of the more stringent shall govern.

D. Fabricators Shop Testing, Inspection and Quality Control:

1. For AISC certified facilities, submit a written program for the proposed fabrication quality control testing and inspection. After review and acceptance of these documents by the Architect/Engineer, perform all shop testing and inspection as specified herein. If the Fabricator's facility is not AISC certified, the Owner's independent testing laboratory will perform all shop testing and inspection work, and the fabricators will be backcharged for this work.
2. Structural Steel Fabrication Shop Quality Control Program: As a minimum, perform at least the following shop tests and inspections and submit daily reports of the results of all tests. State in each report whether the tested specimens conform to all requirements of the Contract Documents, and specifically note any discrepancies. If the inspections indicate defects in the Work, increase the degree of testing to ensure that the full extent of defects in the joint are found and that similar defects are not present in similar joints.

    a. Provide evidence that all welders to be employed in the Work hold current AWS certification for the welding procedures that each will perform. If recertification of welders is required, the retesting is the Contractor's responsibility.
    b. Visually inspect all fabrication operations, including dimensional and fit-up/alignment and control.
    c. Visually inspect all plate edges and rolled shape edges for material defects.
    d. High strength bolted connections:

        1) Check all bolted connections in accordance with the procedures outlined in the RCSC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", latest edition.

    e. Welding visual inspection:

        1) Inspect all welding operations and welds, including edge preparation, fit-up, preheat, and adherence to welding procedures.

            a) Inspect welds prior to shop painting of steel.
            b) Measure the weld profiles for 15 percent of the length of each weld, at random.

    f. Welding magnetic particle testing: Test in accordance with ASTM E109 for a minimum of:

1) 20 percent of all shear plate fillet welds at random, final pass only.
2) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
3) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
4) 20 percent of length of built-up column member partial penetration and fillet welds at random for root and final passes.
5) 100 percent of length of built-up girder member partial penetration and fillet welds for root and final passes.

g. Welding ultrasonic testing: Test in accordance with ASTM E164 and AWS D1.1 for 100 percent of all full penetration welds, braced and moment frame column splices, and a minimum of 20 percent of all other partial penetration column splices, at random.
h. Schedule all work to allow the testing requirements listed above to be completed.

1.3 SUBMITTALS

A. Shop Drawings:

1. Prior to the bulk of shop drawing preparation, submit to the Architect/Engineer shop drawings of "typical conditions" and connections to assure that the fabricators assumptions are correct as to type of connection and other pertinent details.
2. Before any structural steel is fabricated, submit shop drawings to the Architect/Engineer for review and receive approval of same in accordance with Division 01 of this Project Manual.
3. Show all shop and erection details including cuts, copes, connections, holes, threaded fasteners, and welds.
4. Show all welds, both shop and field by the currently recommended symbols of the American Welding Society.

B. Proof of Qualification:

1. Submit to the Architect/Engineer evidence satisfactory to him that the steel fabricator and steel erector are qualified for the Work in accordance with the requirements of this Section of the Project Manual.

C. Certification:

1. Submit to the Architect/Engineer a certification that the materials supplied are in accordance with the requirements of this Section of the Project Manual.

1.4 PROJECT CONDITIONS

A. Field Verification:

1. Confirm all dimensions necessary to make the framing assembly fit accurately.
2. Do not fabricate materials until field dimensions have been confirmed.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Steel Shapes and Plates:

1. All steel w-shapes shall meet the requirements of ASTM A992 or ASTM A572, Grade 50 except plates, angles and channels shall meet the requirements of ASTM A36.

2. All structural steel exposed to the elements shall be hot dipped galvanized unless noted otherwise on the drawings. All welds and scratches on this steel shall be touched up with a galvanic paint.

B. Hollow Structural Section (HSS):

1. Round, square and rectangular HSS sections shall meet the requirements of ASTM A500, Grade B.

C. Pipes:

1. Steel pipes shall meet the requirements of ASTM A501 or ASTM A53, Grade B, Type E or S.

2.2 CONNECTIONS

A. Materials:

1. High-strength bolts for shop and field connections: ASTM A325, 3/4 inch minimum diameter.
2. Anchor bolts, nuts and washers: ASTM F1554, Class per plan, Grade 2A
3. Machine bolts for minor connections: ASTM A307
4. Shear studs: ASTM A108, Grades 1015 through 1020, Headed-stud type, cold finished carbon steel; AWS D1.1, Type B.
5. Welding electrodes: ASTM A233, Series E70XX

B. All shop connections shall be accomplished using high strength bolts or by welding at the Contractor's option.

C. Use high strength bolts for field connections.

D. Bolted connections shall be bearing type connections with threads in the shear plane.

E. Moment connections as detailed in the Contract Documents are designed as welded connections.

F. All connections shall be consistent with the design assumptions associated with Type "2" or Type "3" construction defined by the American Institute of Steel Construction.

G. Minimum thickness of connection material shall be 5/16" unless noted otherwise.

2.3 PRIMER PAINT

A. General:

1. All primer paint for structural steel shall be compatible with the finish coatings described in Division 09 of this Project Manual.
2. Omit paint from structural steel encased in concrete or designated to receive fireproofing, and from all faying surfaces.
3. Omit paint on all non-corrodible finished angles.

2.4 OTHER MATERIALS

A. All other materials not specifically described but required for a complete and proper installation of structural steel, shall be new, free from rust, first quality of their respective kinds, and subject to the acceptance of the Architect/Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to installation of the Work of this Section, carefully inspect the installed Work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that existing conditions will permit the structural steel to be fabricated and erected in strict accordance with the original design, the shop drawings, and the referenced standards.

B. Discrepancies:

1. Do not proceed with fabrication or installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 FABRICATION

A. General:

1. Fabricate all structural steel in strict accordance with the shop drawings and the referenced standards.

B. Shop Cleaning and Priming:

1. Shop cleaning shall meet recommendations of the final finish manufacturer.
2. Shop paint all structural steel one coat where priming is required.
3. Thoroughly clean all steel that is not to be painted.

C. Milling:

1. Mill the bearing surfaces of all columns/compression members.

D. Leveling Nuts:

1. All column base plates shall be supported on leveling nuts unless noted otherwise. The area between the base plate and concrete shall be grouted in accordance with Division 03 Section: Grouting.

3.3 WELDING

A. General:

1. For details of joints, comply with requirements for AWS joints accepted with qualification tests.
2. Use ASTM A233, E-70 series electrodes.
3. Follow applicable sections of AWS specifications.

B. Types of Welds:

1. Unless otherwise noted:

a. Make all fillet welds 3/16" minimum.
b. Make all butt welds full penetration welds, using back-up or chip and back-weld.

3.4 ERECTION

A. General:

1. Erect all structural steel in strict accordance with the drawings, the shop drawings, and all pertinent regulations and standards.

B. Bolted Connections:

1. Accomplish high-strength bolted connections in accordance with the American Institute of Steel Construction's publication, "Specifications for Structural Joints Using ASTM A325 or A490 Bolts."
2. All bolts in bolted connections shall be tightened to the “snug tight condition” unless noted otherwise on the drawings.

C. Touch-Up:

1. After erection is complete:

a. Touch-up all shop priming coats damaged during transportation and erection.
b. Prime all field welds on members that have been welded and paint all field bolts using the priming paint specified for shop priming.

D. Bracing:

1. Furnish, design, and install all temporary erection bracing.
2. Leave such bracing in place until the structure is stabilized by walls, slabs, decks and permanent bracing.

3.5 INSPECTION AND QUALITY ASSURANCE

A. The Testing Laboratory will conduct a program of testing and inspection for both shop fabrication and field erection. During shop fabrication, the program will consist of monitoring the structural steel Contractor's quality control and testing program. If the fabrication facility does not qualify as a certified AISC Category I facility, the Testing Laboratory will perform all shop testing and inspection work. During field erection, the program will consist of all field testing and inspection as specified.

B. Shop Quality Control by Testing Laboratory: Provide periodic monitoring of the Contractor's quality control testing and inspection program. Include the following as a minimum degree of monitoring:

1. Verify all welder qualification and monitor welding procedures and welding processes.
2. Monitor all fabrication operations.
3. Verify and monitor all shop testing and inspection, including review of the Contractor's testing and inspection records.
4. Perform inspection as necessary on those portions of the structural steel not in evidence of complying with the Contract Documents.

C. Field Quality Control by Testing Laboratory: Perform the following quality control tests and inspections. Interpret test results, submit daily reports and monthly summary reports.

1. Examine the Manufacturer's test certificates for all materials provided. Verify that the lot numbers of the tested material coincide with the lot numbers of the material used on-site.
2. Visually inspect all anchor-bolt nut installation and tightening.
3. High strength bolted connections:

    a. Observe the job site calibration of each size bolted fastener assembly and installation technique in the calibrated tension measuring device. Verify that the proper bolt pretension listed in Table 4 of the RCSC "Specification" is achieved and that installation equipment is of sufficient capacity.
    b. Routinely monitor field bolting procedures during bolt installation. Verify that all bolts in all connections are brought to a "snug tight" condition with all plies of the connection in firm contact. Verify that bolts in connections identified as either slip-critical or direct tension connections are being additionally tightened by the proper technique(s) determined in the tension testing device described above.
    c. Check that all bolted connections are being installed in accordance with the procedures outlined in the RCSC "Specification."

4. Welded connections:

a. Obtain qualifications of all welders and verify all welding procedures, including the Contractor's compliance with preheat, weather-protection, electrodes, and welding surface preparation requirements.
b. Visually inspect all field welding operations and welds.

5. Magnetic particle testing: Test in accordance with ASTM E109 for a minimum of:

a. 20 percent of the length of all field fillet welds, at random, final pass only.
b. 25 percent of the length of all field partial penetration welds except column splices, at random, root and final passes.

6. Ultrasonic testing: Test in accordance with ASTM E164 and AWS D1.1 for a minimum of:

a. 100 percent of all field full penetration welds.
b. 100 percent of the length of 25 percent of all field partial penetration column splices, at random.

7. Schedule all work to allow the testing requirements listed above to be completed.
8. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.

D. The following procedure shall be followed for inspection and testing of all joints of the seismic force resisting systems:

1. The testing agency responsible for quality assurance shall submit the following documents to the A/E and the owner:

a. Qualifications of the management and quality assurance personnel designated for the project.
b. Qualification records for the inspectors and non destructive testing technicians designated for the project.
c. Daily or weekly inspection reports including the nonconformance reports.

2. Inspection points and frequencies of quality assurance task and documentation for the seismic load resisting system shall be as explained below:

a. Observe (O): Observe these on a random, daily basis.
b. Perform (P): Perform these functions prior to final acceptance of the item.
c. Document (D): The inspector shall prepare reports indicating that the work meets the requirements of the contract documents. The report shall indicate the deficiencies and whether the noncompliance has been satisfactorily repaired or not. Inspect after repair and provide a report.

3. Visual welding inspection shall be the primary method to confirm the procedure materials and the workmanship are as specified and approved. Minimum inspection tasks shall be as follows:

a. Observe and perform material identification, joint preparation, dimensions, cleanliness tack weld quality and location, backing type, configuration of the access holes, dimensions and cleanliness of the fillet welds and the field welding process.

b. Document visual inspection of the weld for crack, weld/base metal fusion, crater cross-section, weld profile, weld size, undercut, porosity placement of the reinforcement fillets, backing bars/weld tabs removed and finished (if required) and the repair activities.
c. Perform and document all repair or corrective work activities.

4. Nondestructive testing of the welds shall be performed by ultrasonic or magnetic particle testing (MT) as follows:

a. MT inspection for cracks at welding of doubler plates, continuity plates or stiffeners in the k-area base metal within 3" of weld. Document the findings until accepted.
b. Ultrasonic testing shall be performed for all complete joint penetration (CJP) groove weld in materials 5/16" or thicker. Perform MT inspection on 25 percent of all beam-to-column CJP groove welds. Document the findings until accepted.
c. Ultrasonic testing for Lamellar Tearing for base metal thicker than 1-1/2". Document the findings until accepted.
d. MT inspection of beam cope and access hole for beams with 1-1/2" or thicker flange. Document the findings until accepted.
e. MT inspection of reduced beam section repair and web tab removal sites. Document the findings until accepted.

5. Observation of bolting operations shall be the primary method to confirm the materials procedure and workmanship.

a. Verify materials and procedure prior to installation and document the findings until accepted.
b. Document data of all rejected connections until accepted.

END OF SECTION

SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Open-web steel joists.
2. Steel joist substitutes.
3. Joist accessories.
4. Bearing plates for masonry walls.
5. Prime steel joists for finish coating to be applied by others.

B. Related Work Specified Elsewhere:

1. Division 05 Section: Structural Steel Framing
2. Division 05 Section: Composite Metal Decking
3. Division 05 Section: Metal Roof Decking
4. Division 05 Section: Metal Fabrications
5. Division 09 Section: Painting and Finishing, for finishing of exposed structural steel

1.2 DEFINITIONS

A. SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

1. Bearing plates on masonry walls: Bearing pressure shall not exceed 125 psi.

B. Design special joists to withstand design loads with live load deflections no greater than the following:

1. Floor Joists: Vertical deflection of 1/360 of the span.
2. Roof Joists: Vertical deflection of 1/360 of the span.

1.4 SUBMITTALS

A. Shop Drawings: Show layout, designation, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.

1. Indicate locations and details of bearing plates to be embedded in other construction.
2. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

B. Welders Certificates: If requested by the Architect/Engineer, submit copies of the welders certificates for each person performing welding work. Certificates shall indicate compliance with welding qualifications necessary for the Work.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Fabrication and Erection:

1. Details of fabrication and erection of steel joist not specifically covered by the Contract Documents shall conform to the requirements of SJI's "Specifications".

C. Welding:

1. Qualify procedures and personnel according to AWS D1.1, “Structural Welding Code-Steel” and AWS D1.3 “Structural Welding Code-Sheet Steel.”

1.6 PROJECT CONDITIONS

A. Verifying Conditions:

1. Take all necessary field measurements to make all work fit accurately. Do not fabricate any materials until such verification has been made.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Joists:

1. Conform to the material and fabrication requirements of the applicable Steel Joist Institute standard.

B. Shop Paint:

1. Joists exposed to view: prime joists, bridging and bearing plates that will be exposed to view with primer compatible with finished color paint, specified in Division 09.
2. Joists not exposed to view: paint with manufacturer's standard product.
3. Joists scheduled to receive fireproofing: Do not paint. Clean in accordance with SSPC preparation requirements recommended by the fireproofing manufacturer.

PART 3 - EXECUTION

3.1 ERECTION

A. Joists:

1. Set joists, level or with slope indicated, at the spacing shown on the Drawings.
2. Install bridging and permanently fasten joists in place before the application of any loads.
3. Weld all joists to the supporting steel.

B. Joist Bridging:

1. Anchor the ends of all bridging lines terminating at walls or beams at top and bottom chords.
2. Connect diagonal X-bridging by welding at the point of intersection.
3. Install bridging as shown on the Drawings or in accordance with Steel Joist Institute minimum, whichever is more restrictive. Joist manufacturer is to design and provide size, orientation, and spacing of bridging.

C. Welding:

1. Control welding to avoid burn-through of the joist chords.
2. Any joists exhibiting holes in the chords shall be removed from the structure and replaced with a new joist.

D. Field Painting:

1. Paint all field welds and abrasions to match the shop coat.

E. Bearing Plates:

1. Provide joist bearing plates with welded anchors into block

3.2 CLEANING

A. Joists exposed to view, not indicated to receive finish paint: Clean joists of dirt and deleterious material using SSPC SP-1 high-pressure water washing methods, using clean water only.

END OF SECTION 05 21 00

SECTION 05 31 23 — STEEL ROOF DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install all metal decking and accessories necessary to complete the structure and appurtenances as indicated or implied by the Contract Documents.

B. Related Sections:

1. Division 05 Section: Structural Steel Framing
2. Division 05 Section: Composite Metal Decking
3. Division 05 Section: Metal Fabrications

1.2 SUBMITTALS

A. Product Data: Manufacturer's standard printed product information, indicating compliance with requirements.

B. Shop Drawings:

1. Submit shop drawings showing deck layout, projections, openings, framing and supports, type and location of welds, and details of accessories.
2. Shop Drawing shall include:

    a. Deck type, gage, and finish.
    b. Connections of deck to framing members, indicating type and locations.
    c. Connections of deck to adjacent deck pieces, indicating type and locations.
    d. Shop and erection details.
    e. Markings, quantities, and locations of all deck sheets.
    f. Details of all deck accessories.
    g. Locations and dimensions of all shop cut openings.
    h. Details showing method of framing openings less than 12 inches square.

3. Fabrication shall not begin until shop drawings have been reviewed.

4. Test reports shall be derived by engineering calculation or other means acceptable to the Architect so as to demonstrate application to the loading and fire resistance requirements specific to this Project.
    a. Test reports shall therein indicate rationale for all fastening and anchoring requirements specific to the Project.

C. Welding certificates.

D. Field quality-control test and inspection reports.

1.3 QUALITY ASSURANCE

A. Material, Fabrication and Erection: Comply with the following standards:

1. AISI – Specifications for the Design of Cold Formed Steel Structural Members.
2. SDI – Design Manual for Composite Decks, Form Decks, and Roof Decks.

B. Erector Qualifications:

1. Erector: Approved by the fabricator.
2. Welders: AWS qualified according to AWS D1.3, "Structural Welding Code - Sheet Steel" and hold a current and valid certificate.

C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Provide units tested and labeled for use in indicated assembly for fire resistance rating indicated.
2. Label steel deck units with appropriate markings of applicable testing and inspecting agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Protect steel deck and accessories to prevent damage during delivery, storage and handling.

B. Storage:

1. Store steel deck at the project site off the ground, with one end elevated to provide drainage, and covered with a ventilated, waterproof cover.
2. Clean steel deck that has become soiled prior to installation.

1.5 PROJECT CONDITIONS

A. Verifying Conditions:

1. Take all necessary field measurements to make all work fit accurately. Do not fabricate any materials until such verification has been made.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Sheet Steel: ASTM A 653, Structural Steel (SS) Grade 33 or higher, G60 zinc coating.

1. Gage and size as indicated on the Drawings.

B. Primer Painted Sheet Steel: ASTM A 611, Grades C, D or E, 33 ksi minimum yield strength.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.2 ROOF DECK

A. Fabricate roof deck with section properties computed in accordance with AISI "Specification for the Design of Cold-Formed Steel Structural Members".

B. Provide 1-1/2 inch deep, Type B, high tensile steel, wide rib galvanized roof deck that complies with the following minimum requirements:

1. Gage as noted on the drawings.
2. Form deck units length to span three or more support spacing with die set ends to provide 2 inch flush, nested end laps and nesting side laps. Provide thicker deck to meet SDI requirements for single or two span conditions.

C. Prior to forming, clean the sheet steel of all grease, oil and other foreign matter with a phosphatized type cleaner and provide the following protective coating.

1. Steel roof deck shall be free of lubricants or oil, which would significantly impair the adhesion of sprayed-on fireproofing.

D. Maximum deflection under capacity uniform total load shall not exceed L/240.

2.3 ACCESSORIES

A. Provide closures, ridge or valley plates, reinforcing channels, and related accessories in sheet steel with same finish and gage as steel roof deck, 20 gage minimum.

1. Closures: Formed channel equal to deck depth, with 1 inch flanges, or as indicated.
2. Ridge or valley plates: Formed plate with 4-1/2 inch minimum legs, or as indicated.
3. Flat plate: Sheet steel, 9 inch minimum width.

B. Roof Sump Pans: 14 gage minimum, with 3 inch minimum overlapping flange and sump depth to match deck depth.

C. Welding Washers: Form from 16 gage galvanized steel with a 3/8 inch nominal diameter hole.

D. Metal fasteners for fastening side laps: Self-drilling, No. 10 minimum steel-to-steel screws.

1. Reference standard: ITW Buildex; Light-Duty Teks with Hex Washer Head

E. Opening Reinforcement: 16 gage galvanized steel sheet, for penetration openings through deck with dimensions between 8 inches and 12 inches.

2.4 PAINTS AND COATINGS

A. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

B. VOC Limits for anti-corrosive and anti-rust paints applied to interior ferrous substrates: Use materials that do not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, less water.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Check supporting members for correct layout and alignment.

B. Verify that surfaces to receive floor deck are free of debris.

C. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

A. General:

1. Install deck units and accessories in accordance with manufacturer's recommendations and shop drawings.
2. Install deck after structural support is in place, plumb and true.

B. Placing Roof Deck Units:

1. Erect steel deck units beginning at the low side working toward the high side to ensure that end laps are shingle fashion.
2. Position deck units with ends bearing a minimum of 2 inches on supporting members.
3. Align ribs over entire length of run.
4. Provide support angles and closure plates at columns as required to provide adequate support for deck units.
5. Do not stagger joints between panels, except where necessary to maintain multiple spans.

C. Fasten steel roof deck as follows:

1. Flat or moderate sloping framing.

a. Steel roof deck units shall be fastened to the steel framework at each support by welds not less than 5/8" diameter, spaced at no more than 12" across the width of the roof units.
b. The side laps of adjacent units shall be fastened between supports at 2'-0" o.c. with self-tapping screws no smaller than #10.

c. Along edge of roof and where deck changes span directions, steel deck units shall be welded using 5/8" diameter welds to all steel beams extending in a direction parallel to the direction of the deck span at intervals not exceeding 12".
d. Welds shall be free of sharp point edges.

2. Steep Sloping Framing:

a. Steel roof deck units shall be fastened to the steel frame work at each support with #12 TEK screws @ 12" o.c. across the width of the units.
b. The side laps of adjacent units shall be fastened at 16" o.c. with a self-tapping #10 screws.
c. Along edge of the roof steel deck units shall be fastened to steel framing extending in a direction parallel to the direction of the deck span, with #12 TEK screws at 16" o.c. maximum.
d. Power driven or actuated fasteners may be subtitled for #12 TEK screws.

D. Install closures, sump pans, ridge and valley plates, and other accessories required for complete installation in accordance with the manufacturer's specifications and erection drawings. Lap all adjoining pieces 3 inches minimum.

1. Weld closures, sump pans, ridge and valley plates, and reinforcements a maximum of 12 inches on center, with one weld at each corner.

E. Cutting and Fitting:

1. Cut and fit deck units and accessories around projections through floor.
2. Make cuts neat, square and trim.
3. Frame openings 12 inches or larger with structural steel per the "Typical Roof Opening Detail".
4. Reinforce openings between 8 inches and 12 inches with 16 gage sheet with (3) three screws on each side.

a. Extend sheet minimum 3 inches beyond the limits of the penetration.

5. Provide metal closure strips at all open uncovered ends and edges of decking. Weld into position, 2 feet on center maximum.

F. Touch-Up Painting:

1. Wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of deck units.
2. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
3. Apply galvanizing repair paint immediately after welded surfaces have cooled.

3.3 PROTECTION

A. Do not use deck units for storage or working platforms until permanently secured in position.

B. Ensure that construction loads do not exceed carrying capacity of deck.

C. Do not suspend light fixtures, ducts, bulkheads, etc., from the steel roof deck.

END OF SECTION

SECTION 05 36 00 — COMPOSITE METAL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Composite metal decking and accessories necessary to complete the structure and appurtenances as indicated or implied by the Contractor Documents.

B. Related Sections:

1. Division 03 Section: Concrete Formwork
2. Division 03 Section: Concrete Reinforcement
3. Division 03 Section: Cast-in-Place Concrete
4. Division 05 Section: Structural Steel Framing
5. Division 05 Section: Steel Roof Decking

1.2 SUBMITTALS

A. Product Data: Manufacturer's standard printed product information, indicating compliance with requirements.

B. Shop Drawings:

1. Submit shop drawings showing deck layout, projections, openings, framing and supports, type and location of welds, and details of accessories.
2. Shop Drawing shall include:

    a. Deck type, gage, and finish.
    b. Connections of deck to framing members, indicating type and locations.
    c. Connections of deck to adjacent deck pieces, indicating type and locations.
    d. Shop and erection details.
    e. Markings, quantities, and locations of all deck sheets.
    f. Details of all deck accessories.
    g. Locations and dimensions of all shop cut openings.
    h. Details showing method of framing openings less than 12 inches square.

3. Fabrication shall not begin until shop drawings have been reviewed.

C. Welding certificates.

D. Field quality-control test and inspection reports.

1.3 QUALITY ASSURANCE

A. Material, Fabrication and Erection: Comply with the following standards:

1. AISI – Specifications for the Design of Cold Formed Steel Structural Members.
2. Steel Deck Institute – Design Manual for Composite Decks, Form Decks, and Roof Decks.

B. Erector Qualifications:

1. Erector: Approved by the fabricator.
2. Welders: AWS qualified according to AWS D1.3, "Structural Welding Code - Sheet Steel" and hold a current and valid certificate.

C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Provide units tested and labeled for use in indicated assembly for fire resistance rating indicated.
2. Label steel deck units with appropriate markings of applicable testing and inspecting agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Protect steel deck and accessories to prevent damage during delivery, storage and handling.

B. Storage:

C. Store all materials on sills off the ground in such a manner that pieces lie flat without Storage:

1. Store steel deck at the project site off the ground with one end elevated to provide drainage, and s covered with a ventilated, waterproof cover.
2. Clean steel deck that has become soiled prior to installation.

1.5 PROJECT CONDITIONS

A. Verifying Conditions:

1. Take all necessary field measurements to make all work fit accurately. Do not fabricate any materials until such verification has been made.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Composite Steel Deck:

1. Galvanized sheet steel: ASTM A 653, Structural Steel (SS) Grade 33 or higher, G60 zinc coating.

    a. Gage and size as indicated on the Drawings.
    b. Units installed in fire rated assemblies: 20 gage, minimum

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Fire Rated Assemblies:

1. Unit shall be classified for use in UL assembly rating No. D925, or equivalent according to the hourly fire resistance rating required, manufacturer and products selected for fireproofing, and structural member sizes indicated.

2.2 COMPOSITE DECK

A. Fabricate composite deck with section properties computed in accordance with AISI "Specification for the Design of Cold-Formed Steel Structural Members".

1. Formed in fluted sections with interlocking side laps and embossments or other means to provide bond between concrete and deck units.
2. Form deck units in lengths to span three or more support spacing, with flush ends and nesting side laps.

B. Cover Plates:

1. Sheet steel of same quality as deck units
2. Gage to match steel deck before coating
3. Configure to match contour of floor deck units

C. Closure Strips:

1. Sheet steel of same quality as deck units
2. Gage to match steel deck before coating
3. Configure to provide tight-fitting closures at open ends of cells or flutes and sides of floor decking.

2.3 ACCESSORIES

A. Provide closures, reinforcing channels, and related accessories in sheet steel with same finish and gage as steel roof deck, 20 gage minimum.

1. Closures: Formed channel equal to deck depth, with 1 inch flanges, or as indicated.

B. Pour Stops: Form pour stops from galvanized steel to slab thickness indicated.

1. Hem top edge of pour stop with 1/2 inch return turned down 45 degrees from horizontal.

2. Provide pour stops in steel thickness indicated, or if not indicated, in thickness recommended in the SDI "Pour Stop Selection Table".

C. Metal fasteners for fastening side laps: Self-drilling, No. 10 minimum steel-to-steel screws.

1. Reference standard: ITW Buildex; Light-Duty Teks with Hex Washer Head

D. Opening reinforcement: 16 gage galvanized steel sheet, for penetration openings through deck with dimensions between 8 inches and 12 inches.

E. Flexible Closure Strips:

1. Non-fire-rated assemblies: Vulcanized, closed-cell, synthetic rubber.
2. Fire-rated assemblies: Mineral wool safing insulation. Refer to Division 07 Section "Firestopping".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Check supporting members for correct layout and alignment.

B. Verify that surfaces to receive floor deck are free of debris.

C. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

A. General:

1. Install deck units and accessories in accordance with manufacturer's recommendations and shop drawings.
2. Install deck after structural support is in place, plumb and true.

B. Placing Floor Deck Units:

1. Position deck units with ends bearing a minimum of 1-1/2 inches on supporting members.
2. Align cells over entire length of run.
3. Provide support angles and closure plates at columns as required to provide adequate support for deck units and to contain the concrete.
4. Do not stagger joints between panels, except where necessary to maintain multiple spans.

C. Cutting and Fitting:

1. Cut and fit deck units and accessories around projections through floor.
2. Make cuts neat, square, and trim.

3. Install pour stops at floor edge and openings, upturned to top surface of slab.

    a. Provide stops of sufficient strength to remain stationary without distortion.
    b. Do not use pour stops as screeds.
    c. Provide closure strip at end of deck where deck changes direction.

4. Provide angle frame supports at all penetrations through the deck larger than 12 inches in either direction.

D. Fastening Deck Units:

1. Secure floor deck units to supporting members with shear connectors or 3/4 inch minimum diameter fusion welds at 12 inches maximum spacing.

    a. Minimum of two welds per unit at each support.

2. Lock side laps between adjacent deck units at intervals not over 2 feet on center maximum with 5/8 inch diameter puddle welds, 1 inch fillet welds, or self-drilling screws.
3. Tack weld end closures at 2 feet on center maximum
4. Tack weld side closures at 2 feet on center maximum.
5. Welds shall be free of sharp points and edges.

E. Touch-Up Painting:

1. Wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of deck units.
2. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
3. Apply galvanizing repair paint immediately after welded surfaces have cooled.

3.3 PROTECTION

A. Do not use deck units for storage or working platforms until permanently secured in position.

B. Ensure that construction loads do not exceed carrying capacity of deck.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes shop fabricated metal items.
   1. Lintels.
   2. Ledge and shelf angles.
   3. Structural supports for miscellaneous attachments.
   4. Anchor bolts for sill plates.
   5. Steel plate wall cover.
   6. Downspout boot
   7. Other items as indicated on the Drawings.

1.2 REFERENCES

A. American Society for Testing and Materials:
   1. ASTM A36 - Standard Specification for Carbon Structural Steel.
   2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   4. ASTM A283/283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
   5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
   6. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
   7. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

B. American Welding Society:
   1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
   2. AWS D1.1 - Structural Welding Code - Steel.

C. SSPC: The Society for Protective Coatings:
   1. SSPC - Steel Structures Painting Manual.
   2. SSPC SP 1 - Solvent Cleaning.
   3. SSPC Paint 15 - Steel Joist Shop Paint.
   4. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and

details where applicable. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept metal fabrications on site in labeled shipments. Inspect for damage.

C. Protect metal fabrications from damage by exposure to weather.

1.5 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Steel Sections: ASTM A36.

B. Steel Tubing: ASTM A500, Grade B.

C. Plates: ASTM A283.

D. Pipe: ASTM A53, Grade B, Schedule 40.

E. Fasteners.

F. Bolts, Nuts, and Washers: ASTM A325 galvanized to ASTM A153 for galvanized components.

G. Welding Materials: AWS D1.1; type required for materials being welded.

H. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide.

I. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic or Type II Organic, zinc rich.

2.2 LINTELS

A. Lintels: Steel sections, size and configuration as indicated on Drawings, length to allow specified bearing on both sides of opening as indicated on the drawings.
   1. Exterior Locations: Galvanized.
   2. Interior Locations: Prime paint, one coat.

2.3 LEDGE AND SHELF ANGLES

A. Ledge and Shelf Angles, Channels and Plates Not Attached to Structural Framing: For support of masonry; galvanized.

2.4 LADDERS

A. Ladder: ANSI A14.3, Aluminum construction as manufactured by Kattclimb or equal.
   1. Side Rails: 3/8 x 2 side rails spaced at 20 inches.
   2. Rungs: One inch diameter solid rod spaced 12 inches on center.
   3. Mounting: Space rungs 7 inches from wall surface; with mounting brackets and attachments.
   4. Finish: Mill finished aluminum
   5. Performance Standard: OSHA 1910.27
   6. Cages and intermediate landings per OSHA standards.

2.5 DOWNSPOUT BOOTS

A. Cast Iron downspout boots Neenah R-4926-29 Series to fit downspouts provided.

2.6 STRUCTURAL SUPPORTS

A. Other Structural Supports: Steel sections, shape and size as indicated on Drawings required to support applied loads with maximum deflection of 1/240 of the span; prime paint, one coat.

2.7 ANCHOR BOLTS

A. Anchor Bolts: ASTM A307; 3/4 inch steel bolt, standard J-hook, with nut and washer; unfinished. Anchor bolts specifically call out on the drawings take precedence over this note.

2.8 STEEL PLATE WALL COVER

A. Shop primed 3/16" steel plate with constant width dimension and continuous vertical welds grinded smooth, to extend 4" above ceiling. Anchor with tamper proof bolts to wall. Where plates are used for expansion joint covers, anchor only on one wall to allow movement.

2.9 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.10 FACTORY APPLIED FINISHES - STEEL

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items with one coat except where galvanizing is specified.

D. Galvanized Items: Galvanized after fabrication to ASTM A123. Furnish minimum 2.0 oz/sq ft galvanized coating.

2.11 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.

C. Field weld components indicated on Drawings.

D. Perform field welding in accordance with AWS D1.1.

E. Obtain approval of Architect/Engineer prior to site cutting or making adjustments not scheduled.

F. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 1/4 inch per story or for every 12 ft in height whichever is greater, non-cumulative.

C. Maximum Offset from Alignment: 1/4 inch.

D. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 05 50 00

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SECTION 05 51 33.16 - ALUMINUM INCLINED LADDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Fixed, inclined, aluminum, standard ship ladder with handrail.

1.2 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI A14.3 - Ladders, Fixed, Safety Requirements.

B. American Society for Testing and Materials (ASTM) Publications:

1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

2. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

C. Occupational Safety and Health Administration of the Unites States

1. OHSA 1910.23: Fixed Ladders

1.3 SUBMITTALS

A. Provide in accordance with Section 01330 - Submittal Procedures:

1. Product data for inclined ship ladders.

2. Shop drawings showing elevations, dimensions, and fabrication details including template for anchors and bolts specified for installation under other sections.

3. Installation and maintenance instructions.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Ladders to be provided by single manufacturer with minimum of five years of experience in metal ladder fabrication.

B. Access ladders shall be designed and installed to comply with ANSI A14.3. and OSHA 1910.27 minimum standards.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. UPNOVR, Inc

B. Substitutions approved equal

2.2 MATERIALS

A. Extruded aluminum: ASTM B221, Alloy 6061 Temper T-6, non-spark.

B. Sheet aluminum: ASTM B209 6061 Temper T-6.

C. Finish: Mill finished aluminum.

2.3 GENERAL FABRICATION

A. Field verify ladder dimensions prior to fabrication.

B. Components shall be welded and bolted. Ladder may require minor field assembly.

2.4 INCLINED SHIP LADDER

A. Type: Fixed, inclined, aluminum, standard ship ladder with handrail; Model No. U-501as manufactured by UPNOVR, Inc. or approved equal

B. Accommodation height: As indicated on Drawings.

C. Angle of inclination: As indicated on Drawings.

D. Treads: 6” inches deep by 1-3/4 inches heigh by 24 inches wide aluminum extrusion section with abrasive filled corrugations.

1. 12” max tread spacing as indicated on Drawings and reviewed shop drawings.

2. Treads to be welded to ladder stringer

E. Stringers: 6 by 2-1/2 inches aluminum channel.

F. Handrail: Fabricate from 1-1/4 inches diameter aluminum pipe

1. Form returns with 6 inches radius.

2. Attach rail to stringer with pipe sections spaced at no more than 48 inches such that rail projects approximately 6 inches above stringer.

3. Handrail to extend above top tread a minimum of 42”

2.5 ACCESSORIES

A. Support brackets: Support ship ladder with top wall brackets and bottom floor brackets fabricated from 2 by 1/4 inch minimum flat bar aluminum.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to fabrication, field verify required dimensions.

B. Coordinate provision of access ladder with provision of roof hatch specified in Section 07725 - Roof Hatch to ensure height and position of ladder is compatible with roof hatch curb.

C. Coordinate ladder installation with construction of [CMU walls specified in Section 04220 - Concrete Unit Masonry to ensure block walls are adequately reinforced and cells grouted] [metal stud walls specified in Section 05400 - Cold Formed Metal Framing to ensure adequate support and blocking] [structural steel mezzanine and floor framing specified in Section 05120 - Structural Steel] [stud partitions specified in Section 09260 - Gypsum Board Assemblies to ensure adequate support and blocking] for attachment of brackets and support of ladder.

D. Insulate dissimilar metals to prevent electrolysis with bituminous paint or non-absorptive isolation pad to prevent contact.

3.2 INSTALLATION

A. Install inclined ladder in accordance with manufacturer's instructions and reviewed shop drawings.

B. Securely anchor support brackets with fasteners of type specified under other sections. Place wall brackets at top and floor brackets at bottom of ladder.

C. Ensure ladder is plumb, [aligned with center of roof hatch,] and rigid.

D. After installation inspect ladder to verify proper, secure, and safe installation.

E. Clean ladder using clean water and mild detergent. Do not use abrasive agent, steel wool, or harsh chemicals. Rinse with clean water.

END OF SECTION

SECTION 05 52 13 – PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes steel pipe railings, balusters, and fittings.

1.2 REFERENCES

A. American Architectural Manufacturers Association:
   1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.

B. American Society for Testing and Materials:
   1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   4. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
   5. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
   6. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.

C. SSPC: The Society for Protective Coatings:
   1. SSPC - Steel Structures Painting Manual.
   2. SSPC Paint 15 - Steel Shop Paint.
   3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.3 DESIGN REQUIREMENTS

A. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials for handrails, railings, anchors, and connections:
   1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
   2. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
   3. Uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward.
   4. Concentrated and uniform loads above need not be assumed to act concurrently.

B. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
   1. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
   2. Uniform load of 50 lbf/ft. (730 N/m) applied in any direction.

3. Concentrated and uniform loads above need not be assumed to act concurrently.

C. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
1. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

C. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Samples: Submit two 12 inch long samples of handrail. Submit two samples, of Tee and wall bracket.

E. Calculations signed and sealed by a professional engineer in the state of the project shall be submitted for review of the A/E as part of the shop drawing review process.

1.5 FIELD MEASUREMENTS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicated measurements on Shop Drawings.

1.6 QUALITY ASSURANCE

A. Mock-up Panel: one section of railing system for verification.
1. Approximate ½ size using full size components.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents unless such deviations are specifically approved by Architect in writing.

PART 2 PRODUCTS

2.1 HANDRAILS AND RAILINGS

A. Furnish materials to applicable standards

2.2 MATERIALS

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.3 STEEL RAILING SYSTEM COMPONENTS

A. Rails: 1-1/2 inch diameter, extruded tubing conforming to ASTM A53, Grade B, Schedule 40

B. Posts: 1-1/2 inch diameter steel pipe; welded joints

C. Fittings: Elbows, T-shapes, wall brackets, escutcheons; cast steel.

D. Mounting: Brackets and flanges, to suit wall construction.

E. Splice Connectors: Welding collars

F. Exposed Fasteners: Flush countersunk screws or bolt, non removable.

G. Galvanizing: According to ASTM A123, hot dipped galvanized after fabrication.

H. Shop Primer: SSPC Paint 15, Type 1, red oxide.

I. Touchup Primer: Match shop primer.

2.4 FABRICATION

A. Fit and shop assemble components in largest practical sizes for delivery to site.

B. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate site assembly and installation.

C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

E. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.

F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

G. Accurately form components to each other and to building structure.

H. Accommodate for expansion and contraction of members and building movement without damage to connections or members.

PART 3 EXECUTION

3.1 EXAMINATION

A. Administrative Requirements: Coordination and project conditions.

B. Verify field conditions are acceptable and are ready to receive work.

C. Verify concealed blocking and reinforcement is installed and correctly located to receive wall mounted handrails.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete and embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Anchor railings to structure with anchors, plates and angles.

C. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.

D. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 1/4 inch (6 mm) per story, non-cumulative.

C. Maximum Offset from Alignment: 1/4 inch (6 mm).

D. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

SECTION 06 10 53 - WOOD BLOCKING AND CURBING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes: blocking in wall; wood furring and grounds; concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, millwork, doors, window frames, telephone and electrical panel back boards; and other items.

B. Wood treatment.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. American Wood-Preservers' Association:
   1. AWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
   2. AWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.

C. National Institute of Standards and Technology:
   1. NIST PS 20 - American Softwood Lumber Standard.

D. The Redwood Inspection Service:
   1. RIS - Standard Specifications for Grades of California Redwood Lumber.

E. Southern Pine Inspection Bureau:
   1. SPIB - Standard Grading Rules for Southern Pine Lumber.

F. West Coast Lumber Inspection Bureau:
   1. WCLIB - Standard Grading Rules for West Coast Lumber.

G. Western Wood Products Association:
   1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit technical data on wood preservative and fire retardant treatment materials and application instructions.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
   1. Lumber Grading Agency: Certified by NIST PS 20.
   2. Plywood Grading Agency: Certified by APA/EWA.

PART 2 PRODUCTS

2.1 MATERIALS

A. Lumber Grading Rules: AP&PA, RIS, SPIB, WCLIB, WWPA G-5.

B. Miscellaneous Framing: Stress Group D, yellow pine species, 19 percent maximum moisture content, fire retardant treated interior and pressure preservative treated exterior.

C. Plywood: APA/EWA Rated Sheathing Structural I, Grade C-D; Exposure Durability 1; unsanded.

2.2 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: Stainless steel for high humidity and treated wood locations, unfinished steel elsewhere.
   2. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

2.3 FACTORY WOOD TREATMENT

A. Wood Preservative (Pressure Treatment): AWPA C1 using water borne preservative with 0.25 percent retainage.

B. Wood Preservative (Surface Application): Clear type, manufactured by Thompsons Waterseal.

C. Fire Retardant Treatment: Pressure treatment, AWPA C20 for lumber and AWPA C27 for plywood, Interior Type, chemically treated and pressure impregnated; capable of providing a maximum flame spread/smoke development rating of 25/450.

PART 3 EXECUTION

3.1 EXAMINATION

A. Administrative Requirements: Verification of existing conditions before starting work.

B. Verify substrate conditions are ready to receive blocking, curbing and framing.

3.2 PREPARATION

A. Coordinate placement of blocking, curbing and framing items.

3.3 INSTALLATION

A. Set members level and plumb, in correct position.

B. Place horizontal members, crown side up.

C. Space framing and furring 16 inches (400 mm) oc.

D. Secure sheathing to framing members with ends over firm bearing and staggered.

E. Install telephone and electrical panel back boards with plywood sheathing material where required. Size back boards 12 inches (300 mm) beyond size of electrical and telephone panel.

3.4 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment.

B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials, and roofing and related metal flashings. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

END OF SECTION

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SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior plywood hardboard board paneling.

B. Related Requirements:

1. Section 061000 “Rough Carpentry” for furring, blocking and other carpentry work not exposed to view and for framing exposed to view.
2. Section 061053 “Miscellaneous Rough Carpentry” for furring, blocking and other carpentry work not exposed to view.
3. Section 099123 “Interior Painting” for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

A. MDO: Plywood with a medium-density overlay on the face.
B. PVC: Polyvinyl chloride.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

B. Sustainable Design Submittals:

1. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.

2. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
3. Chain-of-Custody Qualification Data: For manufacturer and vendor.
4. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.
5. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
6. Product Data: For installation adhesives, indicating VOC content.
7. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

C. Samples: For each exposed product and for each color and texture specified.
D. Samples for Initial Selection: For each type of product involving selection of colors, profiles or textures.
E. Samples for Verification:

1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. for lumber and 8 x 10 inches for panels.
2. For foam-plastic moldings, with half of exposed surface finished; 50 sq. in.
3. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 x 10 inches for panels.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.8 DELIVERY, STORAGE & HANDLING

A. Stack lumber, plywood and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry and

HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PRODUCTS

2.1 MATERIALS (GENERAL)

A. Regional Materials: The following wood products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

1. Interior trim.
2. Interior plywood hardboard board paneling.
3. Shelving and clothes rods.
4. Interior railings.

B. Composite Wood Products: Products shall be made without urea formaldehyde.

C. Composite Wood Products: Products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".

D. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber, mark grade stamp on end or back of each piece.

E. Softwood Plywood: DOC PS 1.

F. Hardboard: ANSI A135.4.

G. MDF: ANSI A208.2, Grade 130

H. Particleboard: ANSI A208.1, Grade M-2

I. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

1. Color: See Finish Schedule, as selected by Architect, from manufacturer's full range.

2.2 WOOD-PRESERVATIVE TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC1 UC2.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.

2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
4. Do not use material that is warped or does not comply with requirements for untreated material.
5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.

    a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece

6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

    a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

7. Application: Where indicated on Drawings All interior lumber and plywood Insert application.

2.4 PANELING:

A. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1, MMPA WM 9.

    1. Basis of Design Product: Subject to compliance with requirements, or comparable product.
    2. Content: 100% postindustrial recycled wood.
    3. Veneer Matching: N/A
    4. Thickness: 3/8”-1/2”
    5. Panel Size: See Interior Drawings.
    6. Wall Edge: Finished square edge.
    7. Installation: Nail and Glue. Per Manufacturers recommendation.
    8. Finish: See Finish Schedule.
    9. Fire Rating: ASTME-84

B. Accessories:

    1. Strand Woven Timber: Quarter Round ¾” at ceiling and floor joints.

C. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
D. Low-Emitting Materials: Adhesives shall comply with testing and product requirements of the California Department of Public Health's “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers”.
E. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

1. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".
2. Adhesives shall have a VOC content of 30 g/L or less.

F. Installation Adhesive for Foam-Plastic Moldings: Product recommended for indicated use by foam-plastic molding manufacturer.

1. Adhesives shall have a VOC content of 50 g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".

G. Paneling Adhesive: Comply with paneling manufacturer's written instructions for adhesives.

1. Adhesives shall have a VOC content of 50 g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".

H. Multipurpose Construction Adhesive: Formulation, complying with ASTM D 3498, that is recommended for indicated use by adhesive manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".

2.5 FABRICATION

A. Back out or kerf backs of the following members, except those with ends exposed in finished work:

1. Interior standing and running trim, except shoe and crown molds.
2. Wood-board paneling.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16 inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION (GENERAL)

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements or with defective surfaces, sizes or patterns.
B. Install interior finish carpentry level, plumb, true and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING & RUNNING TRIM INSTALLATION

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

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

3.5 PANELING INSTALLATION

A. Prior to the installation, the installer must ensure that the jobsite and site conditions are suitable for installation. Sustainable Flooring is not responsible for flooring failure resulting from unsatisfactory jobsite, subfloor, and temperature/humidity conditions.
B. Board Paneling: Install according to manufacturer's written instructions.

1. Arrange in random-width pattern suggested by manufacturer unless boards or planks are of uniform width.
2. Install in full lengths without end joints.
3. Stagger end joints in random pattern to uniformly distribute joints on each wall.
4. Install with uniform end joints with only end-matched (tongue-and-groove) joints within each field of paneling.
5. Install with uniform end joints. Locate end joints only over furring or blocking.
6. Select and arrange boards on each wall to minimize noticeable variations in grain character and color between adjacent boards.
7. Install with uniform tight joints between boards.
8. Fasten paneling by face nailing, setting nails, and filling over nail heads.
9. Fasten paneling with trim screws, set below face and filled.
10. Fasten paneling by blind nailing through tongues.
11. Fasten paneling with paneling system manufacturer's concealed clips.
12. Fasten paneling to gypsum wallboard with panel adhesive.

3.6 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements.

1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

B. Adjust joinery for uniform appearance.

3.7 CLEANING

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

3.8 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.
B. Remove and replace finish carpentry materials that are wet, moisture damaged and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Extruded polystyrene foam-plastic board.
   2. Molded polystyrene foam-plastic board.
   3. Glass-fiber blanket.
   4. Mineral-wool blanket.
   5. Loose-fill insulation.
   6. Spray foam insulation

B. Related Requirements:
   1. Division 6: Insulation installed directly over steel framing.
   2. Division 7: Insulation installed in relation to waterproofing and Shingle Roofing.
   3. Division 9: Insulation installed in relation to Gypsum Board.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

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

B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.

B. Extruded Polystyrene Board, Type X: ASTM C 578, Type X, 15-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. DiversiFoam Products.
   b. Dow Chemical Company (The).
   c. Owens Corning.

2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

C. Extruded Polystyrene Board, Type IV: ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. DiversiFoam Products.
   b. Dow Chemical Company (The).
   c. Owens Corning.

2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

D. Extruded Polystyrene Board, Type VI, Drainage: ASTM C 578, Type VI, 40-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84; fabricated with shiplap or channel edges and with one side having grooved drainage channels.

1. Manufacturers: Subject to compliance with requirements,:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Kingspan Insulation Limited.
d. Owens Corning.

2.2 MOLDED POLYSTYRENE FOAM-PLASTIC BOARD

A. Molded Polystyrene Board, Type II: ASTM C 578, Type II, 15-psi minimum compressive strength.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. ACH Foam Technologies, Inc.
   b. Atlas EPS; a Division of Atlas Roofing Corporation.
   c. DiversiFoam Products.
   d. Insulfoam-a division of Carlisle Construction Materials Inc.
   e. Plymouth Foam, Inc.

B. Molded Polystyrene Board, Type IX: ASTM C 578, Type IX, 25-psi minimum compressive strength.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. ACH Foam Technologies, Inc.
   b. Atlas EPS; a Division of Atlas Roofing Corporation.
   c. DiversiFoam Products.
   d. Insulfoam-a division of Carlisle Construction Materials Inc.
   e. Plymouth Foam, Inc.

2.3 GLASS-FIBER BLANKET

A. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent.

C. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

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

   a. CertainTeed Corporation.

b. Johns Manville; a Berkshire Hathaway company.
c. Knauf Insulation.
d. Owens Corning.

D. Glass-Fiber Blanket, Reinforced-Foil Faced : ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. CertainTeed Corporation.
   b. Johns Manville; a Berkshire Hathaway company.
   c. Knauf Insulation.
   d. Owens Corning.

2.4 MINERAL-WOOL BLANKETS

A. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Mineral-Wool Blanket, Unfaced : ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Industrial Insulation Group, LLC (IIG-LLC).
   b. ROXUL.
   c. Thermafiber, Inc.; an Owens Corning company.

C. Mineral-Wool Blanket, Reinforced-Foil Faced: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less per ASTM E 84); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Thermafiber, Inc.; an Owens Corning company.

2.5 LOOSE-FILL INSULATION

A. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type I for pneumatic application Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. CertainTeed Corporation.
   b. Johns Manville; a Berkshire Hathaway company.
   c. Knauf Insulation.

2.6 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AGM Industries, Inc.
   b. Gemco.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

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

2. Angle: Formed from 0.030-inch- thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AGM Industries, Inc.
   b. Gemco.

2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
   a. Crawl spaces.
   b. Ceiling plenums.
   c. Attic spaces.

D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space between face of insulation and substrate to which anchor is attached.

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

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AGM Industries, Inc.
   b. Gemco.

2.7 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

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

1. Adhesives shall have a VOC content of 70 g/L or less.

2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Asphalt Coating for Cellular-Glass Block Insulation: Cutback asphalt or asphalt emulsion of type recommended by manufacturer of cellular-glass block insulation.

D. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 36 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 36 inches in from exterior walls.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
2. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:

    a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

a. Exterior Walls: Set units with facing as indicated on Drawings.
b. Interior Walls: Set units with facing placed as indicated on Drawings.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

C. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."

3.6 PROTECTION

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

END OF SECTION 07 21 00

07 52 16 - SBS MODIFIED BITUMEN MEMBRANE ROOFING SYSTEM

I. GENERAL

The project includes the provision of a complete SBS Modified Bitumen membrane roofing system.

A. Summary

1. Furnish and install a complete SBS Modified Bitumen roofing system, including:
   a) Roofing Manufacturer's requirements for the specified warranty
   b) Preparation of roofing substrates
   c) Wood nailers for roofing attachment
   d) Insulation
   e) Cold Adhered SBS membrane
   f) Metal roof edging and copings
   g) Flashings
   h) Walkway pads
   i) Other roofing-related items specified or indicated on the drawings or otherwise necessary to provide a complete weatherproof roofing system

B. Disposal of demolition debris and construction waste is the responsibility of Contractor. Perform disposal in manner complying with all applicable federal, state, and local regulations.

C. Comply with the published recommendations and instructions of the roofing membrane Manufacturer, at http://www.holcimelevate.com, or Approved Equal

D. Commencement of work by the Contractor shall constitute acknowledgement by the Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane Manufacturer.

E. Related Sections (as present or needed)

1. Section 06 10 00 – Rough Carpentry
2. Section 07 71 00 – Roof Specialties
3. Section 22 14 26.13 – Roof Drains

F. Definitions

1. Definitions in the current editions of ASTM D1079 and NRCA's “The NRCA Roofing Manual: Membrane Roof Systems” apply to work of this Section.

G. Submittals

1. Product Data
   a) Provide membrane Manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane Manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
   b) Not FM insured. Only use FM or UL to show compliance with uplift requirements as applicable.

2. Shop Drawings
    a) Provide roof plan indicating orientation of steel deck *(if applicable)*, and fastener and/or adhesive layouts.
    b) Provide the roof membrane Manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
3. Provide copy of Pre-Installation Notice to show that Manufacturer's required Pre-Installation Notice (PIN) has been accepted and approved by the Manufacturer.
4. Specimen Warranty
5. Closeout Submittals
    a) Executed Warranty
    b) Maintenance data

H. Quality Assurance

1. Applicator Qualifications
    a) Current Elevate Contractor in good standing
    b) At least five years' experience in installing specified system
    c) Capability to provide payment and performance bond to building Owner
2. Pre-Installation Conference
    a) Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
    b) Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
    c) Review methods and procedures related to roofing installation, including Manufacturer's written instructions.
    d) Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    e) Examine deck substrate conditions and finishes, including flatness and fastening.
    f) Review structural loading limitations of roof deck during and after roofing.
    g) Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
    h) Review governing regulations and requirements for insurance and certificates if applicable.
    i) Review temporary protection requirements for roofing system during and after installation.
    j) Review roof observation and repair procedures after roofing installation.
    k) Notify Architect well in advance of meeting.

I. Delivery, Storage and Handling

1. Deliver products in Manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
2. Discard and legally dispose of material that cannot be applied within its stated shelf life.
3. Store materials clear of ground and moisture with weather protective covering.
4. Keep combustible materials away from ignition sources.

5. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck and/or structural overloading.

J. Field Conditions

1. Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed in accordance with Manufacturer's written instructions and warranty requirements.

K. Warranty

1. Provide Elevate 20-year Red Shield™ Roofing System Limited Warranty covering membrane, roof insulation, and system accessories. Comply with all warranty procedures required by Manufacturer, including notifications, scheduling, and inspections.
2. Limit of Liability: No dollar limitation (NDL)
3. Scope of Coverage: Repair leaks in the roofing system caused by
   a) Ordinary wear and tear
   b) Normal exposure to the elements
   c) Manufacturing defect in Elevate materials
   d) Defective workmanship used to install these materials
   e) Damage due to winds up to 72 mph
   f) Not Covered:
      (1) Damage due to winds in excess of 72 mph
      (2) Damage due to hurricanes or tornadoes
      (3) Hail
      (4) Intentional damage
      (5) Unintentional damage due to normal rooftop inspections, maintenance, or service

II. PRODUCTS

A. Manufacturers

1. Acceptable Manufacturer – Roofing System: Elevate roofing, lining, and wall systems, Nashville, TN, https://www.elevatecommercialbp.com/us-en
   (1) Or Approved Equal
   b) Roofing systems manufactured by others may be acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the Manufacturer meets the following qualifications:
      (1) Specializing in manufacturing the roofing system to be provided
      (2) Minimum ten years of experience manufacturing the roofing system to be provided
      (3) Able to provide a no dollar limit, single source roof system warranty backed by corporate assets in excess of one billion dollars
      (4) ISO 9001 certified
      (5) Able to provide polyisocyanurate insulation produced in own facilities
2. Manufacturer of Insulation and Cover Board: Same Manufacturer as roof membrane

3. Substitution Procedures: See Instructions to Bidders
    a) Submit evidence that the proposed substitution complies with the specified requirements.

B. Roofing System Description

1. Roofing System
    a) Membrane: Styrene-butadiene-styrene (SBS) modified bituminous mineral granule surfaced cap sheet and smooth base sheet
        (1) Membrane Attachment: Cold Adhesive
    b) Slope: ¼:12 (2%) by means of tapered insulation if not structurally sloped
    c) Comply with applicable local building code requirements.
    d) Provide assembly having Underwriters Laboratories, Inc. (UL) Class A Fire Hazard Classification
    e) Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM Data Sheets 1-28 and 1-29, and meeting minimum requirements of FM 1-90 wind uplift rating.
2. Insulation:
    a) Polyisocyanurate Roofing Insulation:
        (1) Total System R-Value: 20 in 2 layers
            (a) Maximum Board Thickness: 3″ (76.2 mm)
            (b) Stagger joints in adjacent layers
        (2) Base Layer: Polyisocyanurate foam board, non-composite
            (a) Commonly fastened

        (3) Top Layer: Polyisocyanurate foam board, non-composite
            (a) Attachment: Commonly fastened.
            (b) Gypsum-Based Cover Board DensDeck Prime
                (i) Thickness: 0.5″ (12.7 mm)
                (ii) Attachment: Mechanical fastening rate of 8 HD Fasteners and plates per 4x8 board

C. SBS Membrane Materials

1. Cap Sheet: Granule-surfaced SBS modified bitumen roofing membrane Type I Grade G, consisting of select asphalt, modified with styrene-butadiene-styrene, and strengthened with a fiberglass reinforced polyester nonwoven mat.
    a) Color: White
    b) Acceptable Product:
        (1) SBS Glass FR by Elevate
        (2) Siplast Paradiene 30 FR
        (3) Soprema Elastophene RFGR
2. Base Sheet: Smooth-surfaced modified bitumen roofing membrane.
    a) Acceptable Product:
        (1) SBS Base by Elevate

(2) Siplast Paradiene 20
(3) Soprema Elastophene Sanded 2.2

3. Membrane Fasteners: Type and size as required by roof membrane Manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane Manufacturer.
4. Flashing Membrane: Same as field membrane
5. Liquid Flashing Membrane: Two-component urethane elastomer, UltraFlash™ Two-Part Liquid Flashing by Elevate or UltraFlash One-Part by Elevate. Siplast Parapro 123 Flashing System. Soprema ALSAN RS.
6. Membrane Adhesive: Asphalt matrix with non-asbestos fibers; Multi-Purpose MB Cold Adhesive by Elevate
7. Flashing Cement/Lap Adhesive: Asphalt matrix with non-asbestos fibers; Multi-Purpose MB Flashing Cement by Elevate
8. Primer: Meeting ASTM D 41
9. Pourable Sealer: One part polyurethane; One-Part Pourable Sealer
10. Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed; Water Block
11. Metal Plates and Strips used for Fastening Membrane and Insulation: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria
12. Termination Bars: Aluminum bars with integral caulk ledge; 1.3″ (33 mm) wide by 0.10″ (2.5 mm) thick; Termination B
13. Roof Walkway Pads: Same as field membrane

D. Roof Insulation and Cover Boards

1. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with glass reinforced mat laminated to facers, complying with ASTM C 1289 Type II Class 1 with the following additional characteristics:
   a) Thickness: 3.5” in 2 layers
   b) Size: 48″ (1.22 m) by 96″ (2.44 m), nominal (if mechanically fastened) or 48″ (1.22 m) by 48″ (1.22 m), nominal (if adhered)
   c) R-Value (LTTR) per inch (25 mm): min. 6.2R at 40 °F (4.4 °C) and min. 5.7R at 75 °F (23.9 °C)
   d) Compressive Strength: 20 psi (138 kPa)
   e) Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents
   f) Acceptable Product: *(class 1)* ISOGARD GL polyiso board insulation

2. Coverboard

   a) Gypsum-Based Cover Board: Non-combustible, water-resistant gypsum core with embedded glass mat facers, complying with ASTM C 1177/C 1177M, and with the following additional characteristics:
      (1) Size: 48″ (1.22 m) by 96″ (2.44 m), nominal (if mechanically fastened) or 48″ (1.22 m) by 48″ (1.22 m), nominal (if adhered)
      (2) Thickness: 0.5″ (12.7 mm)
      (3) Surface Water Absorption: 2.5 g max., when tested in accordance with ASTM C 473

(4) Surface Burning Characteristics: Flame spread of 0, smoke developed of 0, when tested in accordance with ASTM E 84
(5) Combustibility: Non-combustible, when tested in accordance with ASTM E 136
(6) Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies
(7) Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D 3273 for minimum of 4 weeks

3. Insulation Fasteners: Type and size as required by roof membrane Manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane Manufacturer.

E. ccessory Materials

1. Wood Nailers: PS 20-dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
   a) Width: 3 ½″ inches (90 mm), nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it
   b) Thickness: Same as thickness of roof insulation

III. INSTALLATION

A. General

1. Install roofing, insulation, flashings, and accessories in accordance with roofing Manufacturer's published instructions and recommendations for the specified roofing system. Where Manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
2. Obtain all relevant instructions and maintain copies at project site for duration of installation period.
3. Do not start work until Pre-Installation Notice has been approved by Manufacturer as confirmation that this project qualifies for a Manufacturer's warranty.
4. Perform work using competent and properly equipped personnel.
5. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the Applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
6. Install roofing membrane only when surfaces are clean, dry, smooth, and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult Manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 °F (15 to 25 °C).
7. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
8. Protect from spills and overspray from bitumen, adhesives, sealants, and coatings.
9. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
10. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.

11. Until ready for use, keep materials in their original containers as labeled by the Manufacturer.
12. Consult membrane Manufacturer's instructions, container labels, and Safety Data Sheets (SDS) for specific safety instructions. Keep all adhesives, sealants, primers, and cleaning materials away from all sources of ignition.

B. Examination

1. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment, and that deflection will not strain or rupture roof components or deform deck.
2. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
3. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
4. Examine roof substrate to verify that it is properly sloped to drains.
5. Verify that the specifications and drawing details are workable and not in conflict with the roofing Manufacturer's recommendations and instructions; start of work constitutes acceptance of project conditions and requirements.

C. Preparation

1. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease, and other materials that may damage the membrane.
2. Fill all surface voids in the immediate substrate that are greater than 1/4″ (6 mm) wide with fill material acceptable to membrane Manufacturer.
3. Seal, grout, or tape deck joints, where needed, to prevent seepage into building.

D. Insulation and Cover Board Installation

1. Install insulation in configuration and with attachment method(s) specified in PART 2, under Insulation.
2. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.
3. Lay roof insulation in courses parallel to roof edges.
4. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than ¼″ (6 mm). Fill gaps greater than ¼″ (6 mm) with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than ¼″ (6 mm).
5. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by Factory Mutual for specified FM Class and membrane Manufacturer, whichever is more stringent.

E. SBS Modified Bitumen Membrane Installation

1. Cold Adhesive Application
   a) Start at the low point with a full width sheet; embed sheets in full application of MB cold

adhesive.

b) Maintain one-half sheet stagger between first and second layer; install with minimum 3″ (75 mm) side laps and 6″ (150 mm) end laps; keep sheets free of wrinkles, buckles and fish mouths.
c) Apply adhesive by method and at rate recommended by roof membrane manufacturer.
d) Broadcast granules into adhesive bleed-out at all laps.
e) Complete the entire membrane installation without undue delay.

F. FLASHING AND ACCESSORIES INSTALLATION

1. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane Manufacturer's recommendations and details.
2. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
   a) Follow roofing Manufacturer's instructions.
   b) Remove protective plastic surface film immediately before installation.
   c) Install water block sealant under the membrane anchorage leg.
   d) Flash with Manufacturer's recommended flashing sheet unless otherwise indicated.
   e) Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
   f) If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
   g) When the roof slope is greater than 1:12 (8.3%), apply seam edge treatment along the back edge of the flashing.
3. Scuppers: Set in sealant and secure to structure; flash as recommended by Manufacturer.
4. Roofing Expansion Joints: Install as shown on drawings and as recommended by roofing Manufacturer.
5. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces:
   a) Install weathertight flashing at all walls, curbs, parapets, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8″ (200 mm) above membrane surface.
   b) Use the longest practical flashing pieces.
   c) Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane Manufacturer's recommendations.
   d) Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
   e) Provide termination directly to the vertical substrate as shown on roof drawings.
6. Roof Drains:
   a) Taper insulation around drain to provide smooth transition from roof surface to drain. Use specified pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed Manufacturer's recommendations.

b) Position membrane, then cut a hole for roof drain to allow ½″ to ¾″ (12 to 19 mm) of membrane to extend inside clamping ring past drain bolts.
c) Make round holes in membrane to align with clamping bolts; do not cut membrane back to bolt holes.
d) Apply sealant on top of drain bowl where clamping ring seats below the membrane
e) Install roof drain clamping ring and clamping bolts; tighten clamping bolts to achieve constant compression.

7. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.
8. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
9. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2″ (50 mm) deep, with at least 1″ (25 mm) clearance from penetration, sloped to shed water.
10. Structural Steel Tubing: If corner radii are greater than ¼″ (6 mm) and longest side of tube does not exceed 12″ (305 mm), flash as for pipes; otherwise, provide a standard curb with flashing.
11. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by Manufacturer.

G. Walkway Installation

1. Install walkways at access points to the roof, around rooftop equipment that may require maintenance, and where indicated on the drawings.
a) Use specified walkway pads unless otherwise indicated.
b) Walkway Pads: Adhere to the roofing membrane per manufacture requirements spacing each pad at minimum of 1″ (25 mm) and maximum of 3″ (75 mm) from each other to allow for drainage.
c) If installation of walkway pads over field fabricated splices or within 6″ (150 mm) of a splice edge cannot be avoided, adhere another layer of flashing over the splice and extending beyond the walkway pad a minimum of 6″ (150 mm) on either side.

H. Field Quality Control

1. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system Manufacturer specifically to inspect installation for warranty purposes (e.g., not a sales representative).
2. Perform all corrections necessary for issuance of warranty.

I. Cleaning

1. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.
2. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of Manufacturers of components and surfaces.
3. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

J. Protection

1. Where construction traffic must continue over finished roof membrane, provide durable protection, and replace or repair damaged roofing to original condition.

END OF SECTION

SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Gravel Stops.
2. Reglets and counterflashings.
3. Fascias Extender

B. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 07 92 00 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

C. Samples for Verification:

1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.7 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 07 54 03 "Single Ply Roofing Fully Adhered"

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cheney Flashing Company.
b. OMG Roofing
c. Metal-Era, Inc.

2. Extruded-Aluminum Coping Caps: Extruded aluminum, 0.040 inch thick.

a. Finish: Two-coat fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range

3. Corners: Factory mitered and continuously welded.
4. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.

a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.

2.3 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cheney Flashing Company.

2. OMG Roofing Products
3. Metal-Era, Inc.
4. Sobotec, LTD
5. SAF, Inc.

B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Aluminum Sheet: 0.040 inch thick.
2. Gutter Profile: Style A according to SMACNA's "Architectural Sheet Metal Manual."
3. Applied Fascia Cover (Concealed Gutter): Exposed, formed aluminum, 0.040 inch thick, with factory-mitered corners, ends, and concealed splice joints.
4. Gutter Supports: Straps with finish matching the gutters.
5. Gutter Accessories: Flat ends.

C. Downspouts: Plain rectangular complete with machine-crimped elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Formed Aluminum: 0.063 inch thick.

D. Aluminum Finish: Two-coat fluoropolymer.

1. Color: To be selected by Architect from mfr. std. range.

2.4 REGLETS AND COUNTERFLASHINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cheney Flashing Company.
2. Fry Reglet Corporation.
3. Heckmann Building Products, Inc.
4. OMG Roofing Products
5. Metal-Era, Inc.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Formed Aluminum: 0.024 inch Insert value thick.
2. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
3. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet Insert dimension designed to snap into reglets and compress against base flashings with joints lapped, from the following exposed metal:

1. Formed Aluminum: 0.024 inch thick.

D. Aluminum Finish: Anodic from mfr. full range.

1. .

2.5 FASCIAS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cheney Flashing Company.
2. OMG Roofing Products
3. Metal-Era, Inc.
4. Sobotec, LTD
5. SAF, Inc.

B. Fascias: Provide fascia in shapes and sizes indicated, with shop-mitered and -welded corners. Include water dams formed from at least 0.028-inch- thick, galvanized steel sheet; anchor plates; cleats or other attachment devices; concealed splice plates; and trim and other accessories indicated or required for complete installation, with no exposed fasteners. Provide exposed fascia components fabricated from the following metal:
1. Formed aluminum sheet in 0.063 inch thickness.

2.6 MATERIALS

A. Aluminum Sheet: ASTM B 209 , alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

B. Aluminum Extrusions: ASTM B 221 , alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

2.7 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

E. Aluminum Extrusion Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 2604. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

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

3.2 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer’s required spacing that meets performance requirements.

2. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.4 ROOF-EDGE SPECIALITIES INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 30 inches apart. Attach ends with rivets and [seal with sealant] [solder] to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion-joint caps.

C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

1. Provide elbows at base of downspouts at grade to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

3.6 REGLET AND COUNTERFLASHING INSTALLATION

A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.

B. Embedded Reglets: See Section 04 20 00 "Unit Masonry" for installation of reglets.

C. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.

D. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 71 00

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Non-staining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Polysulfide joint sealants.
6. Latex joint sealants.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.5 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
3. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

C. Low-Emitting Interior Sealants: Sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

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

a. GE Construction Sealants; SCS2700 SilPruf LM .
b. Sika Corporation U.S.; Sikasil WS-290 Sikasil WS-290 FPS.

B. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

    a. Dow Corning Corporation; 758.
    b. GE Construction Sealants; Momentive Performance Materials Inc; SCS2350.
    c. Polymeric Systems, Inc.; PSI-631 PSI-641.
    d. Schnee-Morehead, Inc., an ITW company; SM5731 Poly-Glaze Plus.
    e. Sherwin-Williams Company (The); White Lighning Silicone Ultra All Purpose Sealant.

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

2.4 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

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

    a. LymTal International, Inc.; Iso-Flex 330 Iso-Flex 875R.

B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

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

    a. BASF Construction Chemicals - Building Systems; Sonolastic SL 1.
    b. Pecora Corporation; NR-201.
    c. Polymeric Systems, Inc.; Flexiprene 952.
    d. Schnee-Morehead, Inc.; an ITW company; Permathane SM7101.
    e. Sherwin-Williams Company (The); Stampede 1SL.

2.5 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

    a. Dow Corning Corporation; 786-M White.
    b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
    c. May National Associates, Inc., a subsidiary of Sika Corporation U.S.; Bondaflex Sil 100 WF.
    d. Soudal USA; RTV GP.
    e. Tremco Incorporated; Tremsil 200.

2.6 POLYSULFIDE JOINT SEALANTS

A. Polysulfide, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, polysulfide joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

    a. W.R. Meadows, Inc.; Deck-O-Seal One Step.

2.7 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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. BASF Construction Chemicals - Building Systems; Sonolac.
    b. May National Associates, Inc., a subsidiary of Sika Corporation U.S.; Bondaflex 600 Bondaflex Sil-A 700.
    c. Pecora Corporation; AC-20.
    d. Sherwin-Williams Company (The); 850A 950A PowerHouse.
    e. Tremco Incorporated; Tremflex 834.

2.8 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

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

    a. BASF Construction Chemicals - Building Systems.
    b. Construction Foam Products, a division of Nomaco, Inc.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

    1. Do not leave gaps between ends of sealant backings.
    2. Do not stretch, twist, puncture, or tear sealant backings.
    3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate airpockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 07 95 00 - EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes expansion joint assemblies for floor, wall and ceiling surfaces.

1.2 REFERENCES

A. American Society for Testing and Materials:
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   2. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
   3. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate joint and splice locations, miters, layout of work, affected adjacent construction, and anchorage locations.

C. Product Data: Submit joint assembly profiles, profile dimensions, anchorage devices, available colors and finish.

D. Manufacturer's Installation Instructions: Submit rough-in sizes; provide templates for cast-in or placed frames or anchors; required tolerances for item placement.

1.4 FIELD MEASUREMENTS

A. Verify field measurements are as instructed by manufacturer.

1.5 EXTRA MATERIALS

A. Section 01 70 00 - Execution Requirements: Spare parts and maintenance products.

B. Furnish 20 ft of resilient joint filler and one set of special tools required for accessing and servicing components.

PART 2 PRODUCTS

2.1 EXPANSION JOINT ASSEMBLIES

A. Manufacturers:
   1. Balco/Metalines.

2. Construction Specialties Inc.
3. MM Systems Corp.
4. Inpro

2.2 COMPONENTS

A. Extruded Aluminum: ASTM B221, 6063-T5 alloy.

B. Resilient Filler: Neoprene, exhibiting Shore A hardness of 40 - 50 Durometer.

C. Threaded Fasteners: Cadmium plated steel.

D. Backing Paint: Asphaltic type.

2.3 FABRICATION

A. Joint Covers: Aluminum cover plate, aluminum frame construction, retainers with resilient neoprene filler strip, designed to permit plus or minus 50 percent joint movement with full recovery, flush and recess mounted.

B. Back paint components in contact with cementitious materials.

C. Galvanize embedded ferrous metal anchors and fastening devices.

D. Shop assemble components and package with anchors and fittings.

E. Furnish joint components in single length wherever practical. Minimize site splicing.

2.4 FACTORY FINISHING

A. Floors: Mill finish.

B. Walls and Ceilings: Clear anodized.

C. Resilient Filler Exposed to View: Black.

PART 3 EXECUTION

3.1 EXAMINATION

A. Administrative Requirements: Coordination and project conditions.

B. Verify joint preparation and affected dimensions are acceptable.

3.2 PREPARATION

A. Provide anchoring devices for installation and embedding.

B. Provide templates and rough-in measurements.

C. Coordinate block outs with other trades as required to receive expansion joint systems.

3.3 INSTALLATION

A. Align work plumb and level, flush with adjacent surfaces.

B. Rigidly anchor to substrate to prevent misalignment.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution Requirements: Protecting installed construction.

B. Do not permit traffic over unprotected floor joint surfaces.

C. Install removable strippable coating to protect finish surface.

3.5 SCHEDULES – In this schedule only one of the acceptable manufacturers has been listed. Cross reference products of those acceptable manufacturers listed in paragraph 2.1.

A. Floor Joints at Concrete Topping Floor Finish:

	1. Manufacturer	Style	
	Construction Specialties	GF	GFT

B. Ceiling Joints at Walls at Suspended Acoustical Ceilings:

	1. Manufacturer	Style
	Construction Specialties	FCSC

C. Exterior Wall Joints at Corners of Masonry Walls

	1. Manufacturer	Style
	Inpro	651Series and 651 Series Fire Rated

END OF SECTION

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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 01 Section "General Conditions”.
2. Division 04 Section "Masonry".
3. Division 06 Section “Rough Carpentry”.
4. Division 06 Section “Finish Carpentry”.
5. Division 08 Section “Operations and Maintenance”.
6. Division 08 Section “Door Schedule”.
7. Division 08 Section “Door Hardware Schedule”.
8. Division 08 Section "Glazing".
9. Division 08 Section "Door Hardware”.
10. Division 09 Sections "Painting".
11. Division 26 Section "Electrical”

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. SDI-113 Standard Practice for Determining the Steady-State Thermal Transmittance of Steel Door & Frame Assemblies.
10. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
11. ASTM C1199 - Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods
12. ASTM E1423 - Practice for Determining Steady State Thermal Transmittance of Fenestration Systems.
13. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
14. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
15. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
16. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
17. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
18. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
19. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.
8. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40” above sill) or UL 10C.

1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Smoke Control Door Assemblies: Comply with NFPA 105.

    a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:

1. CECO Door Products (C).
2. Curries Company (CU).

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard polystyrene. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
3. Core Construction: Manufacturer’s thermally enhanced QMax core. Where indicated provide doors fabricated as thermal-rated assemblies with a minimum thermal rating of 0.35 BTU/hr-ft2-F.
4. Level/Model: Level 4 and Physical Performance Level A (Maximum Duty), Minimum 14 gauge (0.067 inch - 1.7-mm) thick steel, Model 2.
5. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
6. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
7. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
8. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
4. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face

sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.

6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. CECO Door Products (C) Polystyrene Core - Legion Series.
2. Curries Company (CU) - Polystyrene Core - 707 Series.
3. Curries Company (CU) - QMax Core - 707 Series.

2.4 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
3. Manufacturers Basis of Design:

    a. Curries Company (CU) - M Series.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
3. Manufacturers Basis of Design:

    a. Curries Company (CU) - M Series.

D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.6 LOUVERS

A. Metal Louvers: Unless otherwise indicated provide louvers to meet the following requirements.

1. Blade Type: Vision proof inverted V or inverted Y.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.7 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator’s shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

E. Glazing: Comply with requirements in Division 08 Section "Glazing" and with the hollow metal door manufacturer's written instructions.

1. Factory Glazing: Factory install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.9 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
3. Louvers: Factory cut openings in door and install louvers into prepared openings where indicated.
4. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

    a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Welded Frames: Weld joints continuously through full throat width of frames, including rabbets, soffits, and stops; grind, fill, dress, and make smooth, flush, and invisible.

a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
6. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
7. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
8. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on-center and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
        5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
9. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
10. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.10 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

B. Factory Pre-Finished: Factory apply electrostatic paint finish to doors and frames in accordance with ANSI A250.3 test procedure acceptance criteria for factory applied finished coatings. Color as selected by the architect from manufacturer’s full range of standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

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

3.2 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.

1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

3.5 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION 081113

SECTION 08 31 00 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Non-rated and fire-rated access door and frame units.

1.2 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Indicate exact position of all access units.

C. Product Data: Provide sizes, types, finishes, scheduled locations, and details of adjoining work.

1.3 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - WALL AND CEILING UNITS

A. Nystrom
B. Acudor Products, Inc.
C. Cesco
D. JL Industries
E. Karp
F. Larsens
G. Milcor
H. Or Approved equal.

2.2 ACCESS UNITS - WALLS

A. Non-Fire Rated Door and Frame Unit: Formed steel:

1. In Cast-in-Place Concrete: Model TM manufactured by Nystrom.

2. In Masonry: Model TM manufactured by Nystrom.

3. In Gypsum Board on Steel Studs: Model TM manufactured by Nystrom.

4. In Plaster on Metal Furring: Model TM manufactured by Nystrom.

2.3 ACCESS UNITS - CEILINGS

A. Non-Fire Rated Door and Frame Unit: Formed steel:

1. In Gypsum Board on Metal Furring: Model TM manufactured by Nystrom.

2. In Plaster on Metal Furring: Model TM manufactured by Nystrom.

3. In Metal T-Bar Concealed Suspension Ceiling: Model RA manufactured by Nystrom.

2.4 FABRICATION - WALL AND CEILING UNITS

A. Fabricate frames and flanges of 16 gauge (1.5 mm) steel.

B. Fabricate door panels of 14 gauge (1.8 mm) steel single thickness steel sheet or double sheet with integral non-combustible batt insulation filler at fire rated units.

C. Weld, fill, and grind joints to assure flush and square unit.

D. Hardware:

1. Hinge: 175 degree steel piano hinge with concealed constant force closure spring type.

2. Lock: Cylinder lock with latch, two keys for each unit.

2.5 FINISHES

A. Base Metal Protection: Galvanized, hot dipped finish. Prime coat units with baked on primer.

B. Finish: Two coats baked enamel, color as selected.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that rough openings for door and frame are correctly sized and located.

3.2 INSTALLATION

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

B. Install frames plumb and level in opening. Secure rigidly in place.

C. Position unit to provide convenient access to concealed work requiring access.

END OF SECTION

SECTION 083613 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes electrically operated sectional doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

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

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied finishes.

1. Include Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sectional doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Failure of components or operators before reaching required number of operation cycles.
c. Faulty operation of hardware.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
e. Delamination of exterior or interior facing materials.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain sectional doors from single source from single manufacturer.

1. Obtain operators and controls from sectional door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Sectional doors shall comply with performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.

1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. , acting inward and outward.
2. Testing: According to ASTM E 330.
3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.

    a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of the door width.
    b. Deflection of horizontal track assembly shall not exceed 1/240 of the door height.

4. Operability under Wind Load: Design overhead coiling doors to remain operable under uniform pressure (velocity pressure) of 20 lbf/sq. ft. wind load, acting inward and outward.

C. Windborne-Debris Impact Resistance: Provide glazed sectional doors that pass missile-impact and cyclic-pressure tests according to ASTM E 1996 for Wind Zone 4.

1. Large Missile Test: For overhead coiling doors located within 30 feet of grade.

2.3 DOOR ASSEMBLY

A. Insulated Steel Sectional Overhead Door: Sectional door formed with hinged sections and fabricated according to DASMA 102 unless otherwise indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Overhead Door Corporation 470 Series Insulated Steel Door or comparable product by one of the following:

    a. C.H.I. Overhead Doors, Inc.
    b. Clopay Building Products.
    c. Overhead Door Corporation.
    d. Raynor.
    e. Rite-Hite Corporation.
    f. Wayne-Dalton Corp.
    g. Windsor Door.

B. Operation Cycles: Door components and operators capable of operating for not less than 50,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. at 15 and 25 mph when tested according to ASTM E 283.

D. Thermal Value: Polystyrene – R-value of 9.83; U-value of 0.201.

E. Track Configuration: Standard-lift, and High-lift

F. Windows: Approximately 24x11 inches and spaced apart the approximate distance indicated on Drawings: in row(s) at height indicated on Drawings: installed with glazing of the following type:
   1. Clear Float Glass: Insulated glazing: 1" or as recommended by door manufacturer.

G. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.

H. Roller-Tire Material: Manufacturer's standard.

I. Locking Devices: Equip door with slide bolt for padlock

   1. Locking Device Assembly: Single-jamb side locking bars, operable from inside with thumbturn.

J. Counterbalance Type: Torsion spring.

K. Electric Door Operator:

   1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
   2. Operator Type: Manufacturer's standard for door requirements.
   3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
   4. Motor Exposure: Interior, clean, and dry.
   5. Emergency Manual Operation: Chain type.
   6. Obstruction-Detection Device: Automatic photoelectric sensor

      a. Sensor Edge Bulb Color: Black As selected by Architect from manufacturer's full range Insert color.

   7. Control Station: Interior-side mounted.
   8. Other Equipment: Audible and visual signals Portable, radio-control system

L. Door Finish:

   1. Factory Prime Finish: Selected from Manufacturer's full range
   2. Finish of Interior Facing Material: selected from Manufacturer's full ranged.
      a. Interior color will be different from exterior color.

2.4 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances indicated on Drawings, Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides for required door type, size, weight, and loading.

1. Galvanized Steel: ASTM A 653/A 653M, minimum G60 zinc coating.
2. Slope tracks at an angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.
3. Track Reinforcement and Supports: Galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches apart for door-drop safety device.

    a. For Vertical Track: Continuous reinforcing angle attached to track and attached to wall with jamb brackets.
    b. For Horizontal Track: Continuous reinforcing angle from curve in track to end of track, attached to track and supported at points by laterally braced attachments to overhead structural members.

B. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

2.6 HARDWARE

A. General: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible. Provide double-end hinges where required, for doors more than 16 feet wide unless otherwise recommended by door manufacturer.

C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- diameter roller tires for 3-inch- wide track and 2-inch- diameter roller tires for 2-inch- wide track.

D. Push/Pull Handles: Equip each push-up operated or emergency-operated door with galvanized-steel lifting handles on each side of door, finished to match door.

2.7 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.

B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Cylinders specified in Section 087100 "Door Hardware" specified in Section 087111 "Door Hardware (Descriptive Specification)" standard with manufacturer and keyed to building keying system.
2. Keys: Two Three Insert number for each cylinder.

C. Chain Lock Keeper: Suitable for padlock.

D. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.8 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.

B. Weight Counterbalance: Counterbalance mechanism consisting of filled pipe weights that move vertically in a galvanized-steel weight pipe. Connect pipe weights with cable to weight-cable drums mounted on torsion shaft made of steel tube or solid steel.

C. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 16 feet long and two additional brackets at one-third points to support shafts more than 16 feet long unless closer spacing is recommended by door manufacturer.

D. Cables: Galvanized-steel, multistrand, lifting cables with cable safety factor of at least 7 to 1.

E. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either lifting cable breaks.

F. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.

G. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.

2.9 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.

1. Trolley: Trolley operator mounted to ceiling above and to rear of door in raised position and directly connected to door with drawbar.
2. Jackshaft, Center Mounted: Jackshaft operator mounted on the inside front wall above door and connected to torsion shaft with an adjustable coupling or drive chain.
3. Jackshaft, Side Mounted: Jackshaft operator mounted on the inside front wall on right or left side of door and connected to torsion shaft with an adjustable coupling or drive chain.

D. Motors: Reversible-type motor for motor exposure indicated.

1. Electrical Characteristics:

    a. Phase: Single phase.
    b. Volts: **208**
    c. Hertz: 60.

2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
3. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
5. Use adjustable motor-mounting bases for belt-driven operators.

E. Limit Switches: Equip motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Device: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.

G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure, push-button control labeled "Close."

1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

H. Emergency Manual Operation: Equip electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 35 lbf.

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

L. Portable, Radio-Control System: Consisting of the following:

1. Portable control device to open and stop door may be momentary-contact type; control to close door shall be sustained- or constant-pressure type.
2. Remote antenna and mounting kit.

2.10 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

1. Two-Coat Baked On Finish

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine locations of electrical connections.

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

3.2 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Tracks:

1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches apart.
2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.

D. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780/A 780M.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 083613

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 06 Section “Rough Carpentry”.
3. Division 06 Section “Finish Carpentry”.
4. Division 08 Section “Operations and Maintenance”.
5. Division 08 Section “Hollow Metal Doors and Frames”.

D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.

4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.

2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. 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. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:

a. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

1. Manufacturers:

a. Medeco (MC).

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

C. High Security Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders certified to UL437, including pick and drill resistance. Pick resistance to incorporate two or more independent locking mechanisms including a pin tumbler device with five or six pin chambers, mushroom-shaped driver pins, and sidebar locking mechanism operated independently from the six top pin tumbler device. Drill resistance to incorporate cylinder housing with fixed case-hardened inserts protecting the pin tumbler shear line, cylinder plugs with case-hardened inserts protecting both the pin tumbler shear line and the side bar, mushroom-shaped stainless steel driver pins, and stainless steel side pins. Cylinders to be factory keyed.

1. New high security key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.

2. Manufacturers:

a. ASSA (AA) - Maximum+.
b. Corbin Russwin (RU) - Access 3 AHS.
c. Corbin Russwin (RU) - Pyramid PHS.
d. Sargent (SA) - Degree DG3.
e. Sargent (SA) - KESO UL.
f. No Substitution.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.4 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.5 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - CLX3300 Series.
b. Sargent Manufacturing (SA) - 10X Line.

2.6 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.7 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.

b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.

2.8 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Heavy duty surface mounted door closers shall have a 30-year warranty.

2. Manufacturers:

    a. Norton Rixson (NO) - 7500 Series.

2.9 ARCHITECTURAL TRIM AND ACCESSORIES

A. Door, Frame and Wall Protective Trim: ANSI/BHMA A156.6, protective products as specified in the hardware sets. Door protection plates shall be not more than 2" less than door width on stop side and 1” less door width on the pull side or on stop side of pairs of doors. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide protective trim with functions and features as follows:

    a. Meets ADA requirements for smooth bottom door surfaces.
    b. UL Classified options for use on fire-rated doors up to 3 hours.
    c. Fabricated from stainless steel, brass, bronze, aluminum, or high-impact plastic.
    d. Available in a variety of sizes, finishes, and profiles to suit aesthetic and functional requirements.
    e. Designed to protect doors, frames, and adjacent walls from damage due to impact, abrasion, or traffic.
    f. Fasteners included; adhesive-backed options available for select models.
    g. Ten-year limited warranty.

2. Manufacturers:

    a. Rockwood (RO).

2.10 DOOR STOPS AND HOLDERS

A. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Rockwood (RO).

B. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

a. Norton Rixson (NO).
b. Rockwood (RO).
c. Sargent Manufacturing (SA).

2.11 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko (PE).

2.12 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.13 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and

reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Refer to Section 080671, Door Hardware Sets, for hardware sets.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glass and glazing.

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

1. Tempered glass.
2. Insulating glass.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturers of insulating-glass units with sputter-coated, low-E coatings and sealant testing agency.

B. Product Certificates: For glass.

C. Product Test Reports: For tinted glass, coated glass, insulating glass and glazing sealants, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications for Security Glazing: Company specializing in the manufacture of Security glass, types as specified, with a documented minimum of five (5) years of experience.

B. Installer Qualifications for Security Glazing: Company specializing in the installation of Security glass products, similar types as specified, with a documented minimum of five (5) years of experience.

C. Security Glazing Forced Entry Tests – Glazing manufacturer must provide current test reports showing products are tested to specified security grade; test must be conducted at an industry accepted laboratory having at least a minimum of 10 years f testibg security glazing.

D. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

E. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

F. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

G. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Install glazing in mockups specified in Section 085413 "Fiberglass Windows" to match glazing systems required for Project, including glazing methods.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:Subject to compliance with requirements, provide product indicated in glass schedules or comparable product by one of the following:

1. AGC Glass Company North America, Inc.
2. Cardinal Glass Industries.
3. Cristacurva.
4. Dlubak Corporation.
5. Gardner Glass, Inc.
6. GGI; General Glass International.
7. Glasswerks LA, Inc.
8. GTI; Glaz-Tech Industries.
9. Guardian Industries Corp.; SunGuard.
10. Hartung Glass Industries.
11. JE Berkowitz, LP.
12. Northwestern Industries, Inc.
13. Oldcastle BuildingEnvelope?.
14. Pilkington North America.
15. PPG Industries, Inc.
16. Schott North America, Inc.
17. Tecnoglass.
18. Trulite Glass & Aluminum Solutions, LLC.
19. Vetrotech Saint-Gobain.
20. Viracon, Inc.
21. Insert manufacturer's name.

B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

1. Obtain tinted glass from single source from single manufacturer.
2. Obtain reflective-coated glass from single source from single manufacturer.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.
2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Wind Design Data: As indicated on Drawings.

C. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with basic - protection testing requirements in ASTM E 1996 for Wind Zone 4 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For laminated-glass lites, properties are based on products of construction indicated.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: ¼ inch.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 FLOAT GLASS PRODUCTS

A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. Furnish tempered glass where heat strengthened glass cannot meet specified performance requirements.
3. T-Clear Glass: Tempered float glass as specified; Class 1 clear.
    a. Minimum Thickness: ¼.
4. Float Glass Manufacturers:
    a. ACH Glass Operations
    b. AFG Industries, Inc.
    c. Guardian Industries Corp.
    d. PPG Industries
    e. Pilkington North America, Inc.
    f. Or Approved Equal

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seal, with manufacturer's standard polyisobutylene and polysulfide polyisobutylene and silicone polyisobutylene and hot-melt butyl polyisobutylene and polyurethane primary and secondary sealants.

2. Perimeter Spacer: Manufacturer's standard spacer material and construction
3. Total Unit Thickness: 1 inch.
4. Inner Pane: ¼ inch thick laminated glass.
5. Outer Pane: ¼ inch thick grey tinted with low E coating, tempered.

    a. Basis-of-Design Product:Subject to compliance with requirements, provide PPG Solargray or approved equal product by one of the following:

        1) AFG Industries, Inc.
        2) Arch Aluminum and Glass
        3) Guardian Industries Corp.
        4) PPG Industries
        5) Viracon

6. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING SEALANTS

A. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, laminated glass core, insulating glass seals and glazing channels.
    1. Silicone Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component; chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining, cured Shore A hardness of 15 to 25.
        a. Color: As Selected
        b. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
    2. Polyurethane Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component, chemical curing, non-staining, non-bleeding, Shore A Hardness Range 20 to 35.
        a. Color: As Selected
        b. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordancw with SCAQMD Rule 1168.

B. Dense Gaskets: Resilient extruded shape to suit glazing channel retaining slot; black.
    1. Neoprene: ASTM C864.
    2. EPDM: ASTM C864.
    3. Silicone: ASTM C1115.

C. Soft Gaskets: ASTM C509; resilient extruded shape to suit glazing channel retaining slot; black.
    1. Neoprene.
    2. EPDM.
    3. Silicone

D. Pre-Formed Glazing Tape: Size to suit application.
   1. Preformed butyl compound 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
      a. Butyl Corner Sealant: ASTM C920 single component non-skinning butyl compatible with glazing tape; color to match tape.
      b. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
   2. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal.
      a. Interior Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

   1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

      a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces Insert temperature change.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 09 01 11 - MAINTENANCE OF FINISHES

GENERAL

1.1 RELATED DOCUMENTS

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

DEFINITIONS

Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

Low-Pressure Spray: 100 to 400 psi**;** 4 to 6 gpm

I. Medium-Pressure Spray: 400 to 800 psi**;** 4 to 6 gpm

SEQUENCING AND SCHEDULING

Perform maintenance repainting in the following sequence, which includes work specified in this and other Sections:

Dismantle existing surface-mounted objects and hardware except items indicated to remain in place. Tag items with location identification and protect.

2. Verify that temporary protections have been installed.
3. Examine condition of surfaces to be painted.
4. Remove existing paint to the degree required for each substrate and surface condition of existing paint.
5. Apply paint system.
6. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste daily.

FIELD CONDITIONS

Weather Limitations: Proceed with maintenance repainting only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.

Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer for surface preparation and during paint application and drying periods.

PART 2 - PRODUCTS

PAINT, GENERAL

A. Material Compatibility:

Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from full range of industry colors

PAINT MATERIALS, GENERAL

VOC Content: Products shall comply with VOC limits of authorities having jurisdiction or:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.

Primers, Sealers, and Undercoaters: 200 g/L.

4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
5. Pretreatment Wash Primers: 420 g/L.
6. Floor Coatings: 100 g/L.
7. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
8. Shellacs, Clear: 730 g/L.

9. Shellacs, Pigmented: 550 g/L.
10. Stains: 250 g/L.

Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Transition Coat: Paint manufacturer's recommended coating for use where a residual existing coating is incompatible with the paint system.

2.3 PAINT MATERIAL MANUFACTURERS

Manufacturers: Subject to compliance with requirements, provide products by the following listed manufacturer.

Basis-of-Design Product: Subject to compliance with requirements, provide products indicated in "Paint Materials" Article or comparable product by one of the following:

Sherwin-Williams.

EXECUTION

3.1 PROTECTION

A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist chemical solutions being used unless the solutions will not damage adjacent surfaces. Use protective materials that are UV resistant and waterproof. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Do not apply chemical solutions during winds of sufficient force to spread them to unprotected surfaces.
3. Neutralize and collect alkaline and acid wastes before disposal.
4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.2 MAINTENANCE REPAINTING, GENERAL

Maintenance Repainting Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at 5 feet away from painted surface and from building exterior at 20 feet away from painted surface.

B. Execution of the Work: In repainting surfaces, disturb them as minimally as possible and as follows:

1. Remove failed coatings and corrosion and repaint.
2. Verify that substrate surface conditions are suitable for repainting.
3. Allow other trades to repair items in place before repainting.

C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use gentle methods, such as scraping and lightly hand sanding, that will not abrade softer substrates, reducing clarity of detail.

Heat Processes: Do not use torches, heat guns, or heat plates.

3.3 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of painting work. Comply with paint manufacturer's written instructions for inspection.

B. Maximum Moisture Content of Substrates: Do not begin application of coatings unless moisture content of exposed surface is below the maximum value recommended in writing by paint manufacturer and not greater than the following maximum values when measured with an electronic moisture meter appropriate to the substrate material:

Concrete: 12 percent.

2. Gypsum Board: 12 percent.
3. Gypsum Plaster: 12 percent.
4. Masonry (Clay and CMU): 12 percent.
5. Portland Cement Plaster: 12 percent.
6. Wood: 15 percent.

C. Alkalinity: Do not begin application of coatings unless surface alkalinity is within range recommended in writing by paint manufacturer. Conduct alkali testing with litmus paper on exposed plaster, cementitious, and masonry surfaces.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

1. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify Architect in writing.

E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

PAINT REMOVAL

General: Remove paint where indicated. Where cleaning methods have been attempted and further removal of the paint is required because of incompatible or unsatisfactory surfaces for repainting, remove paint to extent required by conditions.

1. Application: Apply paint removers according to paint-remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

    a. Apply materials to all surfaces, corners, contours, and interstices, to provide a uniform final appearance without streaks.
    b. After work is complete, remove protection no longer required. Remove tape and adhesive marks.

2. Brushes: Use brushes that are resistant to chemicals being used.

Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that spray methods do not damage surfaces.

a. Equip units with pressure gages.
b. Unless otherwise indicated, hold spray nozzle at least 6 inches from surface and apply material in horizontal, back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.
c. For chemical spray application, use low-pressure tank or chemical pump suitable for chemical indicated, equipped with nozzle having a cone-shaped spray.

For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.

For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.

B. Paint Removal with Hand Tools: Remove paint manually using hand-held scrapers, wire brushes, sandpaper, and metallic wool as appropriate for the substrate material.

PAINT APPLICATION, GENERAL

A. Comply with manufacturers' written instructions for application methods unless otherwise indicated in this Section.

B. Prepare surfaces to be painted according to the Surface-Preparation Schedule and with manufacturer's written instructions for each substrate condition.

Apply a transition coat over incompatible existing coatings.

Blending Painted Surfaces: When painting new substrates patched into existing surfaces or touching up missing or damaged finishes, apply coating system specified for the specific substrate. Apply final finish coat over entire surface from edge to edge and corner to corner.

CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09 01 11

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Framing for gypsum board ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association .

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft..

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

3. Studs and Tracks: ASTM C 645. Steel Studs and Tracks:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) CEMCO; California Expanded Metal Products Co.
2) MBA Building Supplies.
3) MRI Steel Framing, LLC.
4) Phillips Manufacturing Co.
5) Steel Network, Inc. (The).
6) Telling Industries.

b. Minimum Base-Metal Thickness: 0.0269 inch .
c. Depth: As indicated on Drawings.
d. Locations receiving abuse resistant gypsum wall/ceiling panels, high impact resistant panels or exterior sheathing shall be 20 gauge minimum thickness.

B. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch Insert dimension minimum vertical movement.

a. Products: Subject to compliance with requirements, provide one of the following:

1) CEMCO; California Expanded Metal Products Co.; Deflex Clips.
2) ClarkDietrich Building Systems; FTC3FTC5.
3) Fire Trak Corp; PosiKlipRediKlip.
4) Steel Network, Inc. (The); VertiClip SLD Series.
5) Super Stud Building Products Inc.; Deflection Clips.

2. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Products: provide one of the following:

1) Blazeframe Industries; Bare Slotted Track (BST/BST 2).
2) CEMCO; California Expanded Metal Products Co.; CST Slotted Deflection TrackSLP-TRK Slotted Deflection Track.

3) ClarkDietrich Building Systems; SLP-TRK Slotted Deflection Track.
4) MBA Building Supplies; FlatSteel Deflection TrackSlotted Deflecto Track.
5) Metal-Lite; The System.
6) Steel Network, Inc. (The); VertiClip SLDVertiTrack VTD.
7) Telling Industries; Vertical Slip TrackVertical Slip Track II.
8) Insert manufacturer's name; product name or designation.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following::

a. ClarkDietrich Building Systems.
b. MRI Steel Framing, LLC.
c. Insert manufacturer's name; product name or designation.

D. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ClarkDietrich Building Systems.
b. MRI Steel Framing, LLC.
c. Insert manufacturer's name; product name or designation.

2. Depth: 1-1/2 inches .
3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ClarkDietrich Building Systems.
b. MRI Steel Framing, LLC.
c. Insert manufacturer's name; product name or designation.

2. Minimum Base-Metal Thickness: As indicated on Drawings 0.0179 inch 0.0296 inch 0.0329 inch Insert thickness.
3. Depth: As indicated on Drawings 7/8 inch 1-1/2 inches.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 AC193 AC58 AC308 as appropriate for the substrate.

   a. Uses: Securing hangers to structure.
2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

2.4 ACOUSTICAL ISOLATION

A. Resilient Wall Connections (Base and Head)

1. Materials:

   a. The Glass Fiber Isolator shall consist of 7/16 inch thick 10 pound per cubic foot molded fiberglass pads encased in a water resistant elastomeric coating. The base channel of the gypsum board wall shall be anchored using a neoprene isolation bushing per manufacturers recommendations.

   b. Neoprene partition supports shall consist of a 34 inch thick neoprene element and steel and neoprene washer. The neoprene element should be selected for a maximum static deflection of 0.12 inch (3 mm). 3/4" inch thick, closed cell neoprene shall be provided to close gap between floor and plate.

2. Products: Subject to compliance with requirements, provide one of the following:

   a. Wallmat Resilient Partition Isolation Pad (Kinetics).

   b. NPS (Mason).

   c. TMRB (VMC).

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches Insert dimension o.c.
2. Furring Channels (Furring Members): 16 inches Insert dimension o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.

D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Division 9: Non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet, or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 INTERIOR GYPSUM BOARD

A. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Basis of Design Produce: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. American Gypsum.
    b. CertainTeed Corporation.
    c. Georgia-Pacific Building Products.
    d. National Gypsum Company.
    e. USG Corporation.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered

B. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Basis of Design Products: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    a. CertainTeed Corporation.
    b. Georgia-Pacific Building Products.
    c. National Gypsum Company.

2. Core: As indicated
3. Long Edges: Tapered
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.

1. Basis of Design Products: Subject to compliance with requirements, provide product indicated on drawings or comparable by one of the following:

    a. American Gypsum.
    b. CertainTeed Corporation.
    c. Georgia-Pacific Building Products.
    d. National Gypsum Company.
    e. USG Corporation.

2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.

2. Shapes:

    a. Cornerbead.
    b. Bullnose bead.
    c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    d. L-Bead: L-shaped; exposed long flange receives joint compound.
    e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    f. Expansion (control) joint.
    g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping drying-type, all-purpose compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping drying-type, all-purpose compound.
4. Finish Coat: For third coat, use setting-type, sandable topping drying-type, all-purpose compound.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

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

    a. Accumetric LLC.
    b. Franklin International.
    c. Grabber Construction Products.
    d. Hilti, Inc.
    e. Pecora Corporation.
    f. Specified Technologies, Inc.
    g. USG Corporation.
    h. Insert manufacturer's name.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: Vertical surfaces unless otherwise indicated
2. Mold-Resistant Type: As indicated on Drawings
3. Type C: Where required for specific fire-resistance-rated assembly indicated on drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically parallel to framing unless otherwise indicated, or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. Bullnose Bead: Use at outside corners.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use at exposed panel edges.
6. Curved-Edge Cornerbead: Use at curved openings.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Where indicated on Drawings.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
5. Level 5: Where indicated on Drawings.

3.6 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 09 51 23 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes suspended metal grid ceiling system, perimeter trim, acoustic panels, acoustical felt ceiling system, and supplementary acoustical insulation over system units.

1.2 REFERENCES

A. ASTM International:
   1. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
   2. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
   3. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
   4. ASTM E580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
   5. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

B. Ceilings and Interior Systems Construction Association:
   1. CISCA - Acoustical Ceilings: Use and Practice.

C. Underwriters Laboratories Inc.:
   1. UL - Fire Resistance Directory.

1.3 PERFORMANCE REQUIREMENTS

A. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1: 240.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system and wall layouts. Indicate method of suspension where interference exists.

C. Product Data: Submit data on metal grid system components, acoustic units and accessories.

D. Samples: Submit manufacturers standard size samples illustrating material and finish of acoustic units.

E. Samples: Submit two samples each, 12 inches long, of suspension system main runner, cross runner, perimeter molding and hold down clips.

F. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

A. Conform to CISCA requirements.

B. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing required. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

C. Source Limitations:
   1. Acoustical Ceiling Panels: Obtain each type through one source from a single manufacturer.
   2. Suspension System: Obtain each type through one source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
   1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
      a. Smoke-Developed Index: 450 or less.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

C. Provide seismic design of suspended ceiling under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic unit installation.

1.8 SEQUENCING

A. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustic units after interior wet work is dry.

1.9 DILEVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.11 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is upported by them, including light fixtures, HVAC equipment, fire-suppression system, and partitions assemblies.

1.12 EXTRA MATERIALS

A. Section 01 70 00 - Execution Requirements: Spare parts and maintenance products.

B. Furnish 5 percent of total acoustic unit of each type of ceiling panel and grid to provide to Owner.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS

A. Type APC-1
   1. Acceptable Manufacturer/Product:
      a. Armstrong; Dune 1774
         1) Size: as indicated on drawings
         2) Thickness: 5/8 inches.
         3) Light Reflectance: Not less than 0.80.
         4) NRC: Not less than 0.60.
         5) CAC: Not less than 33.
         6) Edge Detail: Tegular
         7) Surface Color: white.

B. Type APC-2
   1. Acceptable Manufacturer/Product:
      a. Armstrong; Clean Room VL
         1) Size: As indicated on drawings
         2) Thickness: 5/8 inches.
         3) Light Reflectance: Not less than 0.80.
         4) NRC: Not less than 0.80.
         5) CAC: Not less than 40.
         6) Edge: Tegular
         7) Surface Color: White.

C. Type APC-3
   1. Acceptable Manufacturer/Product:
      a. Armstrong; HealthZone Ultima 1937
         1) Size: As indicated on drawings.
         2) Thickness: 3/4 inches.
         3) Light Reflectance: Not less than 0.86.
         4) NRC: Not less than 0.80.
         5) CAC: Not less than 38.
         6) Edge: Tegular.
         7) Surface Color: White.
         8) Metal Suspension System Color: White

2.2 GRID

A. Acceptable Manufacturer/Product:

1. Prelude or Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries

B. Non-fire Rated Grid: ASTM C635, intermediate duty; exposed T as indicated; components die cut and interlocking.

C. Fire Rated Grid: ASTM C635, intermediate duty, listed by UL, exposed T; components die cut and interlocking.

1. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
2. Exposed Grid Surface Width: 15/16 inch unless 9/16 is indicated.
3. Grid Finish: White, unless otherwise indicated
4. Accessories: Stabilizer bars, clips, splices, perimeter moldings, hold down clips, and accessories required for suspended grid system.
5. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, Category B, and ceiling system flatness requirement specified.

2.3 ACCESSORIES

A. Acoustic Batt Insulation: ASTM C665, friction fit type, unfaced; 2 inch thick, size cut to fit acoustic system.

B. Gypsum Board: Fire rated type; 5/8 inch thick, ends and edges square, paper faced.

C. Acoustic Sealant For Perimeter Moldings: Acoustical sealant by USG or Pecora.

D. Touch-up Paint: Type and color to match acoustic and grid units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify layout of hangers will not interfere with other work.

3.2 EXISTING WORK

A. Extend existing acoustical ceiling installations using materials and methods as specified.

B. Clean and repair existing acoustical ceilings which remain or are to be reinstalled.

3.3 INSTALLATION

A. Lay-In Grid Suspension System:
   1. Install suspension system in accordance with ASTM C636 and as supplemented in this section.
   2. Install system in accordance with ASTM E580.
   3. Install system capable of supporting imposed loads to deflection of 1/240 maximum.
   4. Locate system on room axis according to reflected plan.
   5. Install after major above ceiling work is complete. Coordinate location of hangers with other work.
   6. Install hanger clips during steel deck erection. Install additional hangers and inserts as required.
   7. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
   8. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
   9. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
   10. Do not eccentrically load system, or produce rotation of runners.
   11. Perimeter Molding:
      a. Install edge molding at intersection of ceiling and vertical surfaces into bed of acoustic sealant.
      b. Use longest practical lengths.
      c. Miter corners.
      d. Install at junctions with other interruptions.
   12. Form expansion joints. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.
   13. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with UL assembly requirements and light fixture ventilation requirements.

B. Acoustic Units:
   1. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
   2. Lay directional patterned units one way with pattern parallel to longest room axis. Fit border trim neatly against abutting surfaces.
   3. Install units after above ceiling work is complete.
   4. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
   5. Cutting Acoustic Units:
      a. Cut to fit irregular grid and perimeter edge trim.
      b. Cut reveal edges to field cut units.
      c. Double cut and field paint exposed edges of tegular units.

6. Where bullnose concrete block corners or round obstructions occur, install preformed closures to match perimeter molding.
7. Lay acoustic insulation for distance of 48 inches on both sides of acoustic partitions.
8. Install hold-down clips to retain panels tight to grid system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
   1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
   2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage of both new and existing systems.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Resilient base.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

C. Samples for Initial Selection: For each type of product indicated.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials**,** from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Shaw Contract
   a. Approved Equal.

B. Product Standard: ASTM F 1700, Type TPR (thermoplastic rubber).

1. Style and Location:
   a. Cove: Provide in areas with resilient floor coverings.

C. Thickness: 1/8”

D. Wear Layer Thickness: 20 mils.

E. Height: 4”.

F. Lengths: Coils in manufacturer's standard length

G. Outside Corners: Job formed.

H. Inside Corners: Job formed.

I. Colors: As selected by Architect from full range of manufacturers colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates.
   1. Precast Concrete
   2. Steel frame.
   3. Exterior CMU

B. Related Requirements:
   1. For shop priming of metal substrates.
      a. Section 05 50 00 "Metal Fabrications" for shop priming metal fabrications.
      b. Section 05 52 13 "Pipe and Tube Railings" for shop painting pipe and tube railings.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
   2. Indicate VOC content.

B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches (200 mm) square.
   2. Apply coats on Samples in steps to show each coat required for system.

3. Label each coat of each Sample.
4. Label each Sample for location and application area.
5. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. Material Compatibility:
   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
      a. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
   1. Flat Paints and Coatings: 50 g/L.
   2. Nonflat Paints and Coatings: 50 g/L.
   3. Primers, Sealers, and Undercoaters: 100 g/L.
   4. Rust-Preventive Coatings: 100 g/L.
   5. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
   6. Pretreatment Wash Primers: 420 g/L.
   7. Shellacs, Clear: 730 g/L.
   8. Shellacs, Pigmented: 550 g/L.

C. Colors: All exterior painting to match existing facility.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
   1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
   2. Testing agency will perform tests for compliance with product requirements.
   3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Fiber-Cement Board: 12 percent.
   3. Masonry (Clay and CMUs): 12 percent.
   4. Wood: 15 percent.
C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
D. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
    1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
    1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
    1. SSPC-SP 2.
    2. SSPC-SP 3.
    3. SSPC-SP 7/NACE No. 4.
    4. SSPC-SP 11.
G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
I. Aluminum Substrates: Remove loose surface oxidation.
J. Wood Substrates:
    1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
    2. Sand surfaces that will be exposed to view, and dust off.
    3. Prime edges, ends, faces, undersides, and backsides of wood.
    4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
    1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
    1. Paint the following work where exposed to view:
        a. Equipment, including panelboards and switch gear.
        b. Uninsulated metal piping.
        c. Uninsulated plastic piping.
        d. Pipe hangers and supports.
        e. Metal conduit.
        f. Plastic conduit.
        g. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
    1. Contractor shall touch up and restore painted surfaces damaged by testing.
    2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:
    a. Prime Coat: Latex, exterior, matching topcoat.
    b. Prime Coat: Primer sealer, latex.
        i. S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
    c. Intermediate Coat: Latex, exterior, matching topcoat.
    d. Topcoat: Latex, exterior, satin.
        i. S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

B. CMU Substrates:

1. Latex System:
    a. Block Filler: Block filler, latex, interior/exterior:
        i. S-W Pro Industrial Heavy Duty Block Filler, B42W150, at 75 to 125 sq. ft. per gal..
    b. Intermediate Coat: Latex, exterior, matching topcoat.

a. Topcoat: Latex, exterior, satin.
    i. S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

2.Latex over Alkali-Resistant Primer System
    b. Prime Coat: Primer, alkali resistant, water based
    c. Prime Coat: Block Filler, Latex, Interior/Exterior.
        i. S-W Loxon Block Surfacer, A24W200, at 50 to 100 sq. ft. per gal. (1.23 to 2.45 sq. m per liter).
    d. Intermediate Coat: Latex, exterior, matching topcoat.
    e. Intermediate Coat: Latex, exterior, matching topcoat.
    f. Topcoat: Latex, exterior, satin.
        i. S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

C. Steel and Iron Substrates:

1. Waterbased Light Industrial Coating System:
    a. Prime Coat: Primer, for metal
    b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, exterior, water-based eggshell.
        i. S-W Pro Industrial Eg-Shel Acrylic B66-660 Series, at 2.5 to 4.0 mils (0.064 to 0.102 mm) dry, per coat.

2. Aluminum Paint System
    a. Prime Coat: Primer, for metal
    b. Intermediate Coat: Aluminum paint, matching topcoat.
    c. Topcoat: Aluminum paint

D. Galvanized-Metal Substrates:

1. Latex System
    a. Prime Coat: Primer, water based.
        i. S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
    b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, exterior, water-based eggshell.
        i. S-W Pro Industrial Eg-Shel Acrylic B66-660 Series, at 2.5 to 4.0 mils dry, per coat.

1. Water-Based Light Industrial Coating System:
    a. Prime Coat: Primer, water based.
        i. S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils (0.127 to 0.254 mm) wet, 2.0 to 4.0 mils dry.
    b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, exterior, water-based eggshell.
        i. S-W Pro Industrial Eg-Shel Acrylic B66-660 Series, at 2.5 to 4.0 mils dry, per coat.
    d. Aluminum Paint System: same system as galvanized.
    e. Aluminum Substrates: same system as galvanized

E. Stainless-Steel Substrates:
    1. Latex System
        a. Prime Coat: Primer, bonding, solvent based
            i. Sherwin-Williams, DTM Wash Primer, B77Y1 Series, .7-1.4 mils dry, per coat.
        b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
        c. Topcoat: Light industrial coating, exterior, water-based eggshell.
            i. S-W Pro Industrial Eg-Shel Acrylic B66-660 Series, at 2.5 to 4.0 mils dry, per coat.

F. Wood Substrates: Glued-laminated construction.

G. Wood Substrates: Exposed framing.
    1. Latex System
        a. Prime Coat: Primer, latex for exterior wood.
            i. S-W Exterior Latex Primer, B42, at 4.0 mils wet, 1.4 mils dry, per coat.
        b. Intermediate Coat: Latex, exterior, matching topcoat.
        c. Topcoat: Latex, exterior, satin:
            i. S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

I. Wood Substrates: Architectural woodwork.
    1. Latex System:
        a. Prime Coat: Primer, latex for exterior wood.
            i. S-W Exterior Latex Primer, B42, at 4.0 mils wet, 1.4 mils dry, per coat.
        b. Intermediate Coat: Latex, exterior, matching topcoat.
        c. Topcoat: Latex, exterior, flat:
            i. S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils wet, 1.2 mils dry, per coat.
        d. Topcoat: Latex, exterior, satin:

i. S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

END OF SECTION 09 91 13

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. Sherwin-Williams Company (The). (Basis of Design)

B. Products: Subject to compliance with requirements, provide product listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Dry-Fog Coatings: 150 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Rust-Preventive Coatings: 100 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and CMUs): 12 percent.
4. Wood: 15 percent.
5. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Aluminum Substrates: Remove loose surface oxidation.

H. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Tanks that do not have factory-applied final finishes.
    g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    g. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. CMU substrates: Latex System:
   1. Block Filler
      a. S-W PrepRite Block Filler, B25W25 Block Filler, latex, interior/exterior
   2. Intermediate Coat: Latex, Interior matching topcoat
   3. Topcoat: Latex, interior Eggshell
      a. ProMar 200zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.6 dry, per coat.

B. Metal Substrates (Aluminum, Steel, and Galvanized Steel):
   1. Latex System:
      a. Prime Coat: Primer, rust-inhibitive, water-based: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
      b. Intermediate Coat: Water-based acrylic, interior, matching topcoat.
      c. Topcoat: Water-based acrylic, semi-gloss:
         1) Pro Industrial Pro-Catalyzed Water based Epoxy Semi-Gloss, K46 series at 2.5 to 4.0 mills dry, per coat.
   2. Water-Based Dry-Fall System:
      a. Topcoat: Dry-Fall latex, flat:
      b. S-W Pro Industrial Waterborne Acrylic Dry-fall flat, B42-80 Series at 6.0 mils wet, 1.7 mils dry.

C. Gypsum Board Substrates:
   1. Latex System:
      a. Prime coat: Primer, latex, interior: S-W ProMar 200 VOC Latex Primer, B28W2600 at 4.0 mils wet, 1.5 mils dry.
      b. Intermediate Coat: Latex, interior, matching topcoat
      c. Topcoat: Latex, interior, flat (ceilings)
         1) ProMar HP Zero VOC Interior Latex Eggshell, B20W01951 Series at 4.0 mils wet, 1.7 mils dry.
   2. Latex System: Restrooms:
      a. Prime Coat: Primer, Latex, interior:

1) ProMar 200 Zero VOC Latex Primer, B8W2600 at 4.0 mils wet, 1.5 mils dry.

b. Intermediate Coat: Latex, interior matching topcoat

c. Topcoat: Latex, interior eggshell (Ceilings)
   1) Paint Shield Interior Latex flat microbicidal paint, D12w51 at 4.0 mils wet, 1.6 mils dry.

d. Topcoat: Latex, interior, flat (Walls)
   1) Paint Shield Interior Latex Eggshell microbicidal paint, D12W51 at 4.0 mils wet, 1.6 mils dry.

END OF SECTION 099123

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:

1. Exterior Substrates:

a. Steel.
b. Galvanized metal.

2. Interior Substrates:

a. Concrete masonry units (CMUs).
b. Steel and Non-ferrous Metals.
c. Steel Trim, Doors, and Windows

B. Related Requirements:

1. Section 05 12 00 "Structural Steel Framing" for shop priming of structural steel with primers specified in this Section.
2. Section 05 52 13 "Pipe and Tube Railings" for shop priming pipe and tube railings with coatings specified in this Section.
3. Section 09 91 13 "Exterior Painting" for general field painting.
4. Section 09 91 23 "Interior Painting" for general field painting.

1.3 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. PPG Architectural Finishes, Inc.
3. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
4. Sherwin-Williams Company (The).
5. Tnemec Company, Inc.
6. Carboline .

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

C. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 7/NACE No. 4.
2. SSPC-SP 11.
3. SSPC-SP 6/NACE No. 3.
4. SSPC-SP 10/NACE No. 2.
5. SSPC-SP 5/NACE No. 1.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

G. Aluminum Substrates: Remove loose surface oxidation.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 COATING SYSTEMS FOR INTERIOR STEEL AND NONFERROUS METALS

A. Interior Exposed Structural Steel :

1. System Type: Hydrophobic Acrylic Polymer

2. Surface preparation: SSPC-2 or SSPC-3 and concrete surface shall be clean and dry.
3. Primer: Tnemec Series 115 applied at DFT 3.0 to 4.0 mils.
4. Primer: Carboline Santile 120 Applied at DFT 2.0 to 3.0 mils.
5. Finish Coat: Tnemec Series 115 applied at DFT 3.0 to 4.0 mils.
6. Finish Coat: Carboline Sanilite 120 applied a DFT 2.0 to 3.0 mils.

B. CMU Substrates:

1. System Type: Cementitious Acrylic/Hydrophobic Acrylic Polymer
2. Surface Preparation: Allow CMU to cure for 14 days. Level protrusions and mortar splatter.
3. Prime/Fill: Tnemec Series 130 applied at 60 to 80 square feet to totally fill porosity of CMU to create smooth surface.
4. Prime/Fill: Carboline Sanitile 100 applied at 60 to 80 square feet to totally fill porosity of CMU to create smooth surface.
5. Intermediate Coat: Tnemec Series 1029 applied at DFT 3.0 mils.
6. Intermediate Coat: Carboline Sanitile 155 applied at DFT 3.0 mils.
7. Finish Coat: Tnemec Series 1029 applied at DFT 3.0 mils.
8. Finish Coat: Carboline Sanitile 155 applied at DFT 3.0 mils.

C. Showers (CMU)

1. System Type: Cementitious Acrylic/Epoxy/Ceramic Modified Acrylic Polyurethane
2. Surface Preparation: Allow substrates to cure for 14 days. Level protrusions.
3. Prime/Fill: Tnemec Series 130 applied at 60 to 80 square feet to totally fill porosity of CMU to create smooth finish.
4. Prime/Fill: Carboline Sanitile 500 applied at 60 to 80 square feet to totally fill porosity of CMU to create smooth finish.
5. Intermediate Coat: Tnemec Series 280 applied at DFT 8.0 to 10.0 mils.
6. Intermediate Coat: Carboline Sanitile 280 applied at DFT 2.0 to 3.0 mils.
7. Finish Coat: Tnemec Series 297 applied at DFT 2.0 to 3.0 mils.
8. Finish Coat: Carboline Sanitile 555 applied at DFT 2.0

3.7 COATING SYSTEMS FOR SHOP-PRIMED STEEL TRIM, DOORS, RAILINGS,WINDOWS - INTERIOR AND EXTERIOR :

A. Steel

1. System Type: Hydrophobic Acrylic Polymer
2. Surface Preparation: Clean and dry.
3. Primer: Tnemec Series 115 applied at AFT 2.0 to 3.0 mils.
4. Primer: Carboline Carbocrylic 120 applied at DFT 3.0 to 4.0 mils.
5. Intermediate Coat (Field): Tnemec Series 1029 applied at DFT 2.0 to 3.0 mils.
6. Intermediate Coat (Field): Carboline Sanitile 155 applied at DFT 2.0 to 3.0 mils.
7. Finish Coat (Field): Tnemec Series 1029 applied at DFT 2.0 to 3.0 mils.
8. Finish Coat (Field): Carboline Sanitile 155 applied at DFT 2.0 to 3.0 mils.

END OF SECTION 09 96 00

SECTION 10 11 00 - VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes markerboards.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A135.4 - Basic Hardboard.
   2. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. ASTM International:
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. Federal Specification Unit:
   1. FS CCC-W-408 - Wall Covering, Vinyl-Coated.
   2. FS L-P-1040 - Plastic Sheets and Strips (Polyvinyl Fluoride).

1.3 SUBMITTALS

A. Shop Drawings: Indicate wall elevations, dimensions, and joint locations, and special anchor details.

B. Product Data: Submit data on markerboards surface covering, trim and accessories.

C. Samples: Submit two 4 x 6 inch (100 x 150 mm) in size illustrating materials and finish, color and texture of markerboard, and trim.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit Operation and Maintenance Data.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 WARRANTY

A. Furnish five year manufacturer warranty for visual display boards.

B. Warranty: Include coverage of markerboard surface from discoloration due to cleaning, crazing or cracking, and staining.

PART 2 - PRODUCTS

2.1 VISUAL DISPLAY BOARDS

A. Manufacturers:
   1. Bendheim
   2. Claridge Products and Equipment.

2.2 COMPONENTS

A. Glass Markerboards
   1. Glass: ¼ -inch thick, tempered, low-iron, extra clear, safety writing glass with polished edges
   2. Glass Markerboard writing surface: Smooth finish intended for use with dry-erase markers
   3. Glass Sizes: 4'-0" x 10'-0".
   4. Back-Painted Color: Black, furnished if color not specified (optional colors available). Specially formulated back paint creates a durable paint/glass bond that is fade resistant, water resistant, heat resistant, and environmentally friendly and free of unsafe chemicals.
   5. Backing: Magnetic glass markerboards have steel backing permanently adhered to the back of the glass. (BPG – Back-painted glass markerboards do not have steel backing.)
   6. Surface finsh: Matte

2.3 ACCESSORIES

A. Aluminum Accessory tray equipped with double-sided tape

B. Cleaning Instruction Plate: Provide instructions for chalkboard cleaning on metal plate fastened to perimeter frame near chalkrail.

2.4 MOUNTING METHODS

A. 4. MGMI - Invisi-Mount – no visible mounting hardware; concealed hanger mounted to back of board. Full-length, minus 3", concealed z-bar hanger for the wall. Furnished with 3M Dual Lock™ fasteners to hold bottom of board firmly in place. Z-bar mounting method to pass 500 lb. load test without failure.

2.5 FABRICATION – FRAME AND TRIM

A. Aluminum Frame: Of standard profile; concealed fasteners, map rail with cork insert over chalkboard, markerboard, and tackboard surfaces.

B. Aluminum Chalkrail: Of standard profile, one piece full length of markerboard, closed ends; concealed fasteners.

2.6 FACTORY FINISHING

A. Back painted glass: color as selected.

B. Aluminum Frame, Chalkrail, and Accessories: Clear anodized finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify internal wall blocking is ready to receive Work and positioning dimensions are as indicated on shop drawings and instructed by manufacturer.

B. Verify flat wall surface for frameless adhesive applied type.

3.2 INSTALLATION

A. Deliver factory built units completely assembled and of dimensions shown in details and in accordance with manufacturer's shop drawings as approved by the architect.

B. Follow manufacturer's instructions for storage and handling of units before installation.

C. Do not install on damp walls or in damp and humid weather without heat in the building.

D. Install level and plumb, keeping perimeter trim straight in accordance with manufacturer's recommendations.

3.3 CLEANING

A. Cover chalkboard surfaces with protective cover, taped to frame.

B. Verify that all accessories are installed as required for each unit.

C. At completion of work, clean surfaces and trim in accordance with manufacturer's recommendations, leaving all materials ready for use.

D. Remove temporary protective cover at date of Substantial Completion.

END OF SECTION 10 11 00

SECTION 10 14 00 - EXTERIOR SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes specialty signs.

B. Forms of specialty signs required include the following:
   1. Plaque.
   2. Painted OH Door Signage

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign/letter.

C. Provide physical sample of cast aluminum letters

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Package signs, labeled in name groups.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is lower than recommended by manufacturer.

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers of Metal Letters and Plaques:
   1. A.R.K. Ramos.
   2. Andco Industries, Inc.
   3. Gemini Incorporated.
   4. OMC Industries.

5. Leeds Aluminum Letters.
6. Matthews.
7. Metal Arts.
8. Mills Manufacturing, Inc.
9. Southwell Co. (The).
10. Or approved equal

2.2 COMPONENTS

A. Signage:
1. Size: match existing
2. Border: Single line.
3. Background: manufactured standard, finish as selected by Architect from manufacturer's full range.
4. Font: to be selected by the Architect from the manufacturer's standards.
5. Mounting: Flush mount.
6. Text: as indicated on drawings
7. Location: As directed.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install signs after surfaces are finished, in locations scheduled.

B. Install signs level, plumb and at heights required by applicable code.

C. Wall Mounted Signs: Use manufacturer's standard brackets, fittings and hardware as appropriate for mounting signs.

3.2 CLEANING AND PROTECTION

A. At completion of installation, clean soiled sign surface in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.

END OF SECTION 10 14 00

SECTION 10 14 23.13 - ROOM-IDENTIFICATION SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes room-identification signs that are directly attached to the building.
B. Related Requirements:
   1. Section 10 14 16 "Plaques" for one-piece, solid metal signs, with or without frames, that are used for high-end room-identification.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: For room-identification signs.
   1. Include fabrication and installation details and attachments to other work.
   2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
   3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
   1. Include representative Samples of available typestyles and graphic symbols.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Variable Component Materials: 12 replaceable text inserts and interchangeable characters (letters, numbers, and graphic elements) of each type.
   2. Tools: One set(s) of specialty tools for assembling signs and replacing variable sign components.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration of finishes beyond normal weathering.
      b. Deterioration of embedded graphic image.
      c. Separation or delamination of sheet materials and components.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" ICC A117.1.

2.2 ROOM-IDENTIFICATION SIGNS

A. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Design intent is the match existing jail facility.
      a. Signworks: Troy Drews: 402-321-6564
      b. Dynamark

   2. Laminated-Sheet Sign: face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.
      a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
      b. Color(s): As selected by Architect from manufacturer's full range.

3. Sign-Panel Perimeter: Finish edges smooth.
   a. Edge Condition: Square cut.
   b. Corner Condition in Elevation: Square.

4. Mounting: Surface mounted to wall with adhesive.

5. Text and Typeface: Accessible raised characters and Braille typeface as selected by Architect from manufacturer's full range. Finish raised characters to contrast with background color, and finish Braille to match background color.

6. Size: Manufacturer standard room signage size.

7. Location: all rooms require signage.

2.3 SIGN MATERIALS

A. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

2.4 ACCESSORIES

A. Adhesive: As recommended by sign manufacturer.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.

2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.

4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to the accessibility standard.
   3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Accessibility: Install signs in locations on walls according to the accessibility standard.

C. Mounting Methods:
   1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

3.2 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23.13

SECTION 10 21 00 - LOUVERS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fixed louvers, frames and accessories to replace existing.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Samples: Submit two 12 x 12 inch in size illustrating finish and color of exterior and interior surfaces.

1.3 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.4 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with installation of flashings.

1.5 WARRANTY

A. Section 01 70 00 - Execution Requirements: Product warranties and product bonds.

B. Furnish twenty year manufacturer warranty for louvers.

C. Warranty: Include coverage for degradation of fluoropolymer finish.

PART 2 PRODUCTS

2.1 LOUVERS

A. Manufacturers:
1. Airline Products Co.
2. Airolite.
3. Airstream.
4. American Warming and Ventilating Co.
5. Cesco Products.
6. Construction Specialties Inc.
7. Dowco Products Groups.
8. Greenheck Corp.

9. Industrial Louvers Inc.
10. Ruskin.

B. Louver Construction: Aluminum.

2.2 COMPONENTS

A. Aluminum: ASTM B221, 6063-T5 alloy; extruded shape; prefinished with shop applied fluoropolymer finish.

B. Screen

2.3 ACCESSORIES

A. Fasteners and Anchors: Stainless steel type.

B. Primer: As recommended by the Manufacturer.

C. Flashings: Of same material as louver frame. Sheet aluminum.

D. Sealants: Silicone type, manufactured by Dow Corning or Sonneborn.

2.4 FACTORY FINISHING

A. Exterior Aluminum Surfaces, Screen and Blank-Out Sheeting: Pre-painted finish of color as selected by the Architect from full range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

3.2 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

D. Secure louvers in opening framing with concealed fasteners, removable for maintenance purposes.

E. Install perimeter sealant and backing rod in accordance with Section 07900.

3.3 CLEANING

A. Section 01 70 00 - Execution Requirements - Final cleaning.

B. Strip protective finish coverings.

C. Clean surfaces and components.

END OF SECTION

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Private-use bathroom accessories.

B. Related Requirements:

1. Division 8: Frameless mirrors.

1.3 REFERENCES

A. ANSI A117.1 – Safety Standards for the Handicapped.

B. ASTM A123 – Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM A167 – Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

D. ASTM A269 – Seamless and Welded Austenitic Stainless-Steel Tubing for General Service

E. ASTM A366 – Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

1.4 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper internal wall reinforcement, installation, adjustment, operation, cleaning, and servicing of accessories.

1.5 ACTION SUBMITTALS

A. Product Data: Provide data on accessories describing size, finish, details of function, and attachment methods.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on drawings.
2. Identify accessories using designations indicated on drawings.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 REGULATORY REQUIREMENTS

A. Conform to ANSI A117.1 code and the Americans with Disabilities Act (ADA) for access for the handicapped.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated.

PART 2 - PRODUCTS

2.1 ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Toilet Tissue (Roll Dispenser):
1. Basis of Design Product: Subject to compliance requirements, provide Bobrick B-4288 or comparable product by one of the following:
   a. American Specialties, Inc.; ASI Group
   b. Bradley Corporation
2. Description: Multi-roll dispenser
3. Mounting: Surface mounted
4. Finish: Polished Chrome

C. Grab Bars:
1. Basis of Design Product; Subject to compliance with requirements, provide Bobrick; B-6806.99 or comparable product by one of the following:
   a. American Specialties, Inc.; ASI Group
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation

2. Mounting: Flanges with concealed fasteners.
3. Outside Diameter: 1-1/2 inches
4. Configuration and Length: As indicated on Drawings.

D. Mirror Unit
   1. Approved Manufacturers:
      a. American Specialties, Inc.; ASI Group
      b. Bobrick Washroom Equipment, Inc.
      c. Bradley Corporation
   2. Frame: Frameless
      a. Corners: Manufacturers Standard
      b. Hangers: Produce rigid, tamper-and theft-resistant installation, using method indicated below:
         1) One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts
         2) Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
      c. Size: As indicated on drawings.

E. Sanitary Napkin Disposal
   1. Basis of Design Product: Subject to compliance with requirements, provide Bobrick B-270 or comparable product by one of the following:
      a. American Specialties, Inc.; ASI Group
      b. Bradley Corporatoin
   2. Description: Stainless Steel, fully welded unit
   3. Material and Finish: Satin Finish
   4. Location: As indicated on drawings

F. Robe Hook:
   1. Basis of Design Product: Subject to compliance with requirements, provide Bobrick B-6727 or comparable product by one of the following:
      a. American Specialties, Inc.; ASI Group
      b. Bradley Corporatoin
   2. Description: Double-prong unit
   3. Material and Finish: Polished Chrome
   4. Location: As indicated on drawings

G. Under Lavatory Guard:
   1. Basis of Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
      a. Plumberex Specialty Products, Inc.
      b. Truebro by IPS Corporation
   2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from pipping; allow service access without removing coverings.
   3. Material and Finish: Antimicrobial, molded plastic, white.
   4. Location: At all exposed piping under lavatories.

H. Automatic Paper Towel Dispenser:

1. Basis of design Bobrick B-72974

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Specialties, Inc.; ASI Group.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.

3. Mounting: Surface mounted
4. Minimum Capacity: Standard rolls up to 8inches wide and 8 inches in diameter
5. Material and Finish: Hich impact resin materials
6. Lockset: Manufacturer standard.
7. Location: As indicated on the drawings

I. Automatic Liquid-Soap Dispenser:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Specialties, Inc.; ASI Group.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.

2. Description: Designed for dispensing antibacterial soap in lather form. Basis of Design Bobrick G-950FA
3. Mounting: Surface mounted
4. Capacity: 30 oz.
5. Materials: Type -316 stainless steel with satin finish
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.
8. Location: As indicated on drawings

J. Diaper-Changing Station:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Specialties, Inc.; ASI Group.
   b. Diaper Deck & Company, Inc.
   c. Koala Kare Products.
   d. SafeStrap Company, Inc. (SSC, Inc.).

2. Description: Horizontal Vertical unit that opens by folding down from stored position and with child-protection strap.

   a. Engineered to support minimum of 250-lb static load when opened.

3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed

4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: HDPE in manufacturer's standard color HDPE with plastic-laminate insert in color selected by Architect Stainless steel, No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners Stainless steel, No. 4 finish (satin), exterior shell with rounded plastic corners; HDPE interior in manufacturer's standard color
6. Liner Dispenser: Built in.

K. Utility Shelf:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Specialties, Inc.; ASI Group.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.

2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
3. Size: See drawings.
4. Material and Finish: Not less than nominal 0.05-inch- thick stainless steel, No. 4 finish (satin).

L. Mop and Broom Holder: installed at all mop basins

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Specialties, Inc.; ASI Group.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.

2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches.
4. Hooks: Four.
5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

   a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
   b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.2 MATERIALS (UNLESS NOTED OTHERWISE0

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.3 FABRICATION

A. Weld and grind joints of fabricated components, smooth.

B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.

C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges. Form bar with 1-1/2 inches (75 mm) clear of wall surface. Knurl grip surfaces.

D. Shop assemble components and package complete with anchors and fittings.

E. Provide steel anchor plates, adapters, and anchor components for installation.

F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 2 keys to Owner's representative.

2.4 FINISHES

A. Chrome/Nickel Plating: ASTM B456, Type SC 2 polished finish.

B. Stainless Steel: No. 4 polished finish

C. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.

B. Verify exact location of accessories for installation.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

C. Install accessories in accordance with manufacturers' instructions and ANSI A117.1

3.4 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

3.5 SCHEDULE

A. See architectural and plumbing drawings for more information.

END OF SECTION 10 28 00

SECTION 10 44 00 - FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fire extinguishers; fire extinguisher cabinets; and brackets for wall mounting.

1.2 REFERENCES

A. National Fire Protection Association:
   1. NFPA 10 - Standard for Portable Fire Extinguishers.

B. Underwriters Laboratories Inc.:
   1. UL - Fire Protection Equipment Directory.

1.3 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10 and applicable code.

B. Provide extinguishers classified and labeled by testing firm acceptable to authority having jurisdiction for purpose specified and indicated.

C. Provide fire extinguisher cabinets classified and labeled by testing firm acceptable to authority having jurisdiction for purpose specified and indicated.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, location and fire ratings.

C. Product Data: Submit extinguisher operational features, color and finish and anchorage details.

D. Manufacturer's Installation Instructions: Submit special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not install extinguishers when ambient temperatures are capable of freezing extinguisher ingredients.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

A. Manufacturers:
1. JL Industries.
2. Kidde Fire Extinguishers.
3. Larsen's Manufacturing Co.
4. Potter Roemer.

B. Dry Chemical Type: UL 299, Cast steel tank, with pressure gage; Class A, B, C, Size 10.

C. Extinguisher Finish: Steel, enamel to red color.

D. Security Electronics Room: Clean agent type 11lb wall mount extinguisher – Halotron or equal.

2.2 ACCESSORIES

A. Extinguisher Brackets: Formed steel, white enamel finish.

B. Cabinet Signage: Fire Extinguisher.

C. Graphic Identification: Symbol.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

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

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, no more than 54 inches above finished floor to top of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets and on wall brackets.

E. Position cabinet signage as required by authorities having jurisdiction.

3.3 SCHEDULES

A. Refer to the Drawings for locations.

END OF SECTION 10 44 00

SECTION 10 53 00 - CANOPY

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Work in this section includes furnishing and installation of extruded aluminum overhead post and beam supported and roll formed aluminum hanger rod style canopies.

B. Related Items and Considerations

1. Flashing of various designs may be required. Generic flashing supplied by supplier. Specialty flashing to be supplied by installer.
2. Determine wall construction, make-up and thickness.
3. Ensure adequate wall condition to carry canopy loads where required.
4. Consider water drainage away from canopy where necessary.
5. Any necessary removal or relocation of existing structures, obstructions or materials.
6. Coordinate installation with Pre-Engineered Metal Building manufacturer.

1.2 QUALITY ASSURANCE

A. Products meeting these specifications established standard of quality required as manufactured by Mapes Industries, Inc. or approved equal.

1.3 FIELD MEASUREMENT

A. Confirm dimensions prior to preparation of shop drawings.

B. Submit shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly.

1.4 PERFORMANCE REQUIREMENTS

A. Canopy must conform to local building codes.

B. PE Stamped calculations are required and must be signed and sealed by an engineer licensed within the state canopy is installed.

1.5 DELIVER, STORAGE, HANDLING

A. Deliver and store all canopy components in protected areas.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Mapes Canopies, Lincoln, Nebraska

    a. Or approved equal

2.2 MATERIALS

A. Hanger Rod Decking shall consist of an interlocking roll-form 2 1/2 W style pan (.032" aluminum).

B. Intermediate framing members shall be roll formed/extruded aluminum, alloy 6063-T6, in profile and thickness.

C. Hanger rods and attachment hardware shall be powder coated.

D. Fascia shall be standard 8" extruded J style.

2.3 FINISHES

A. Finish type shall be - 2-coat Kynar finish or Powder Coat Finish
    a. Color selected by Architect from manufacturer's full range.

2.4 FABRICATION

A. All canopies shall be shipped in preassembled sections for ease of installation.

B. Support columns and gutter beams shall be designed such that the columns will be notched to create a "saddle" that will receive and secure the gutter beams.

C. All connections shall be mechanically assembled utilizing 3/16 fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.

D. Decking shall be designed with interlocking aluminum members.

E. Concealed drainage. Water shall drain from covered surfaces into intermediate trough and be directed to a standard post drain.

PART 3 EXECUTION

3.1 INSPECTION

A. Confirm that surrounding area is ready for the canopy installation.

B. Installer shall confirm dimensions and elevations to be as shown on drawings provided by supplier.

C. Erection shall be performed by an approved installer and scheduled after all concrete, masonry and roofing in the area is completed

3.2 INSTALLATION

A. Installation shall be in strict accordance with manufacturer s shop drawings. Particular attention should be given to protecting the finish during handling and erection.

B. After installation, entire system shall be left in a clean condition.

END OF SECTION 10 53 00

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SECTION 10 60 50 - WIRE MESH PARTITIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes wire mesh system.

1.2 REFERENCES

A. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
4. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
5. ASTM A510 - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
6. ASTM A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel (Metric).
7. ASTM A580/A580M - Standard Specification for Stainless Steel Wire.
8. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
9. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
10. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

B. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

C. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.

1.3 DESIGN REQUIREMENTS

A. Design partition system to provide for movement of components without damage, undue stress on fasteners or other detrimental effects, when subject to design loads.

B. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate plan and vertical dimensions, elevations, component details; head, jamb, and sill details; location of hardware. Include component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related work.

C. Product Data: Submit data for screen materials, finishes.

D. Samples: Submit two samples, 12X12 inch in size illustrating screen material. Submit samples of hinge and latchset illustrating style, color, and finish.

E. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 FIELD MEASUREMENTS

A. Verify field measurements.

PART 2 PRODUCTS

2.1 WIRE MESH PARTITIONS

A. Manufacturers:
1. Acorn Wire Mesh Partitions.
2. The GS Co..
3. Miller Wire Works.
4. Wire Crafters, Inc.
5. Or Approved Equal.

2.2 COMPONENTS

A. Framing Members: ASTM A36/A36M, formed steel sections ASTM A500, Grade B cold formed steel tubing ASTM A501 hot formed steel tubing.

B. Woven Screen Wire: ASTM A510 uncoated double crimped steel wire; conforming to the following:

1. Fill Wire Size: 6 gage.
2. Mesh Size: 2 x 2 inch.

C. Welding Materials: AWS D1.1; type required for materials being welded.

D. Bolts, Nuts and Washers: Hot dip galvanized.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, unobtrusively located, consistent with design of structure.

2.3 ACCESSORIES

A. Bracing: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

C. Post Caps: Manufacturer's standard.

D. Floor and Ceiling Pilaster Shoe: Manufacturer's standard.

E. Floor Base: Manufacturer's standard.

F. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

G. Hinges.

H. Latch Sets.

I. Cylinder Locks by Best Locks keyed to the Best system.

J. Corner Posts: 1-3/4 x 1-3/4 inch size.

K. Engineered steel horizontal framing. Location: as indicated on drawings.

2.4 FABRICATION

A. Fit and assemble in largest practical sections for delivery to site, ready for installation.

B. Make exposed joints flush or tight.

C. Furnish components required for anchorage to adjacent construction.

D. Frame openings made for penetrating mechanical and electrical components.

E. Fabricate door for hinged operation.

2.5 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Prime paint items with two coats. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Shop Finished Surfaces: Color as selected by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify substrate surfaces and required openings are ready to receive work.

3.2 PREPARATION

A. Clean substrate surfaces.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb or Level: 1/4 inch (6 mm).

C. Maximum Misalignment from Indicated Position: 1/4 inch (6 mm).

3.5 ADJUSTING

A. Section 01 70 00 - Execution Requirements: Testing, adjusting, and balancing.

B. Adjust hinged doors to achieve free movement.

END OF SECTION 10 60 50

SECTION 11 16 10 LOADING DOCK EQUIPMENT AND ACCESORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes prefabricated steel Dock Leveler Lift, operating hardware, bumpers and dock seals.

1.2 REFERENCES

A. American Society for Testing and Materials:

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

B. National Electrical Manufacturers Association:

1. NEMA MG 1 – Motors and Generators.

C. Underwriters Laboratories Inc.:

1. UL – Electrical Appliance and Utilization Equipment Directory.

D. American National Standards Institute (ANSI): ANSI MH29.1 Safety Requirements for Industrial Scissor Lifts.

1.4 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete: Coordination with dock construction.

B. Section 26 05 00 - Basic Electrical Methods and Materials: Coordination with power requirements and controls/safety circuits.

1.4 SUBMITTALS

A. Section 01 30 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate required opening dimensions, tolerances of opening dimensions, placement dimensions of safety lock device, perimeter conditions of construction.

C. Product Data: Submit materials and finish, installation details, roughing-in measurements, operation of unit and safety lock device.

D. Manufacturer's Installation Instructions.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit operating instructions, identify unit limitations. Submit unit maintenance information, lubrication cycles, spare parts manual.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum twenty years documented experience, and with service facilities within 100 miles of project.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

PART 2 PRODUCTS

1.1 DOCK LEVELERS AND DOCK LOCK

A. Acceptable Manufacturers:

1. Vestil Manufacturing (Basis of Design)
2. Rite-hite
3. Or Approved Equal

1.2 COMPONENTS

A. Hydraulic Dock Leveler:

1. Product: 6'x8' Elec. Hyd. Dock Leveler 20k. by Vestil
2. Model EH-68-20
3. Deck Width: 72 inches
4. Bumper Projection: 4 1/2"
5. Ramp Projection: 16"
6. Uniform Capacity: 20,000 lbs
7. Service Range: 5" Above/ 5" Below
8. Dock Height: Min. 48"
9. Unit includes:
   a. Motor
   b. Pump
   c. Control Box,
   d. Cylinder
   e. Hydraulic lines/oil
   f. Treadplate ramp
   g. Deck construction
   h. Integral Dock Bumpers
10. Power requirement: 460V - 3 PH – 2hp

B. Dock Seals:

1. Manufacturer: Vestil or approved Equal.
2. Size to accommodate dock section door size: see Architectural Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify rough-in opening is acceptable.

3.2 PREPARATION

A. Coordinate integral anchor placement by Section 03 10 00.

B. Coordinate installation with electrical requirements for complete system installation.

3.3 INSTALLATION

A. Install dock leveler and accesories per mfr's. recommendations.

B. Set square and level.

C. Anchor unit securely, flush with slab.

3.4 ADJUSTING

A. Section 01 70 00 - Execution Requirements: Testing, adjusting, and balancing.

B. Adjust installed unit for smooth and balanced operation.

3.5 DEMONSTRATION AND TRAINING

A. Demonstrate operation and maintenance requirements to Owner's personnel.

END OF SECTION 11 16 10

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SECTION 11 19 10 - DETENTION EQUIPMENT, FURNISHINGS AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor shall furnish plant and field labor, equipment, appliances, services and materials, perform work and otherwise assume all responsibility related to fabrication and installation of detention equipment indicated in this section.

1.2 SECTION INCLUDES

A. Detention furnishings, equipment and accessories.

B. Detention metal fabrications.

C. Miscellaneous steel embedded anchoring plates, bars, angles or channels required to anchor detention equipment to concrete or masonry.

D. Built-in steel detention vent grilles for security penetrations in ceilings, walls and floors.

E. Steel plate sub-frames for visitor stations to be built into masonry.

F. Pass through, package passes or hopper passes to be built into masonry.

1.3 RELATED WORK TO BE PERFORMED BY OTHERS

A. Division 3 - Concrete

1. Receive, unload, place into building and cast into place:
   a. Miscellaneous steel embedded anchoring plates, bars, angles or channels required to anchor detention equipment to concrete work in strict compliance with drawings and setting diagrams provided by DEC.
   b. Other detention metal fabrications to be cast into concrete.

2. Closely coordinate delivery of embedded items and other detention metal fabrications with DEC and unload promptly to prevent unnecessary delay in departure of delivering carrier.

3. Complete concrete curbs and other concrete work in connection with detention equipment after installation and final adjustment.

B. Division 4 - Masonry

1. Receive, unload, place into building and set or build into place:
   a. Miscellaneous steel embedded anchoring plates, bars, angles or channels required to anchor detention equipment to masonry work in strict compliance with drawings and setting diagrams provided by DEC.

b. Other detention metal fabrications to be built into masonry.

2. Closely coordinate delivery of embedded items and other detention metal fabrications, and hollow metal frames with DEC, and unload promptly to prevent unnecessary delay in departure of delivering carrier.

C. Division 9 - Finishes

1. Remove foreign materials such as mortar, plaster, concrete, waterproofing and dust from surfaces of detention equipment prior to finish painting.

2. Retouch shop coat of rust inhibiting primer paint and finish paint detention equipment after installation and final adjustment.

3. Complete floor finishes, waterproofing, plastering and painting on or near detention equipment after installation and final adjustment.

D. Division 22 - Plumbing

1. Furnish and install finished plumbing in detention areas.

2. Closely coordinate plumbing work with DEC. Provide drawings, templates or other information required to identify requirements for plumbing penetrations through detention partitions in time for DEC to shop-cut holes prior to shipment to job site. Plumbing Contractor responsible for accuracy of layout information.

3. If layout information not received in time to shop-cut holes, DEC shall field-cut holes for plumbing requirements according to Plumbing Contractor's layout at Plumbing Contractor's expense. Additionally, any changes or additions required after these holes have been cut shall be made at Plumbing Contractor's expense.

E. Division 23 - Heating, Ventilating and Air Conditioning.

1. Install heating, ventilating and air conditioning (HVAC) duct work required in detention area after installation of detention equipment.

2. Closely coordinate HVAC work with DEC. Provide drawings, templates or other information required to identify requirements for HVAC penetrations through detention partitions in time for DEC to shop-cut holes prior to shipment to job site. HVAC Contractor responsible for accuracy of layout information.

3. If layout information not received in time to shop-cut holes, DEC shall field-cut holes for HVAC requirements according to HVAC Contractor's layout at HVAC Contractor's expense. Additionally, any changes or additions required after these holes have been cut shall be made at HVAC Contractor's expense.

F. Division 26 - Electrical

1. Coordinate electrical power requirements with Security Automation Systems Contractor and GC.

2. Furnish and install required conduit and standard back boxes for systems and equipment. This conduit system to be installed per approved conduit drawings.

3. Install special back boxes, cabinets and enclosures furnished by Security Automation Systems Contractor including, but not limited to, speaker back boxes, equipment racks and cabinets.

1.4 SYSTEM DESCRIPTION

A. Design requirements: Detention equipment shall be designed specifically for detention use, simple in construction and operation, and free from parts susceptible to unusual wear or maintenance requirements.

B. Performance requirements: Detention equipment shall be use-proven through satisfactory performance under actual jail or prison conditions.

1.5 SUBMITTALS

A. Submit shop drawings for approval prior to fabrication and delivery of materials or products.

B. Include following minimum requirements in initial submittal package:

1. Embed floor plans and details:
   a. Provide floor plans indicating proper location of embeds.
   b. Provide dimensional requirements for vertical and horizontal locations in elevations of walls containing embeds.
   c. Show complete details of embedded items.

2. Failure to provide any part of minimum requirements described above will result in rejection of total submittal package.

C. Discrepancies:

1. Direct Architect's attention to any discrepancies between detention equipment drawings and Contract Drawings.

2. Subsequent discrepancies that may be discovered by other contractors during construction are to be immediately reported to Architect and DEC for resolution.

3. Other contractors shall not proceed with any work affecting detention equipment until such discrepancies are completely resolved.

D. Architect will not coordinate drawings for composite parts of joint-venture efforts

under this Section. Partial or separate drawing submittals for various components required herein will result in rejection of total submittal package.

E. Provide drawings for field distribution and contract records after approval of all submittals.

F. Detention Equipment Manufacturer Physical Attack Test Certification. Certification is to be considered a submittal requirement prior to the manufacturer proceeding with production.

1.6 TEST REPORTS

A. Testing Laboratory:

1. Independent testing laboratory capable of compliance with specifications of American Society for Testing and Materials (ASTM).

2. Selected by DEC.

3. Approved by Architect.

4. Furnish certification and reports directly to DEC with copies for transmittal to Architect.

B. DEC responsibilities:

1. Absorb costs associated with testing.

2. Submit test reports to Architect prior to delivery of following materials to job site:
   a. Tool resisting steel.

1.7 REGULATORY REQUIREMENTS

A. Perform work in compliance with latest editions of:

1. Federal, state, and local codes and ordinances, or agencies having jurisdiction.

2. National Electric Code, NFPA 70.

3. Standard for Fire Doors and Windows, NFPA 80.

4. Life Safety Code, NFPA 101-88.

B. In cases where Specifications call for materials or construction of better quality or larger size than codes require, Specifications shall take preference. Codes shall govern in cases of direct conflict with Specifications or Contract Drawings.

1.8 DELIVERY, STORAGE AND HANDLING

A. Packing and shipping:

1. Wrap and crate finished components and assemblies at factory to prevent damage or marring of surface finishes during shipping and handling.

2. Handle and transport detention equipment to job site carefully to prevent damage.

B. Acceptance at site:

1. Coordinate delivery of detention equipment embedded items with GC in accordance with construction progress and schedule to avoid delays.

2. Coordinate size of building access and route to location of equipment installation with GC.

3. Upon delivery, immediately inspect components and assemblies for damage and remove damaged items from job site. Damaged components will be rejected and will not be incorporated into the work.

4. General Contractor:
   a. Receive from carrier, unload, and store materials furnished under this section but not installed by DEC.
   b. Install embedded items in correct locations, plumb, true, and to tolerances prescribed by DEC.

C. Storage and protection:

1. Provide adequate protection for products and materials during storage and installation.

2. General Contractor:
   a. Provide adequate protection for materials furnished under this section but not installed by DEC during storage and after installation.
   b. Provide secure, dry storage area or room for DEC storage in each building and on each floor.

1.9 SEQUENCING AND SCHEDULING

A. Submit detailed schedule of field installation activities to Architect or CM, as applicable at least two months before field installation is to begin. Activities to describe all aspects of field installation.

B. Submit revised schedule to Architect or CM, as applicable each month showing status of each activity and revised project completion date.

1.10 WARRANTY

A. Prior to final acceptance, provide Owner with written warranty covering devices furnished under this section for period of one (1) year from date of substantial completion. During this period, make necessary repairs and corrections to defects in

Work and replace defective parts at no cost to Owner.

B. Warranty does not cover consequential or incidental damages. Work made necessary by abuse, misuse, accidents, or negligence of using personnel is excluded from this agreement.

C. Provide emergency service during warranty period, including maximum twenty-four (24) hour response time for emergency calls requiring visits to facility.

1.11 MAINTENANCE MANUALS/SPARE PARTS

A. Operating and maintenance manuals: Provide Owner with two (2) operating and maintenance manuals for items furnished and installed under this section. Clearly identify all parts and include manufacturer's standard part number for each component of various mechanisms.

1.12 SUBSTITUTIONS AND PRE-APPROVALS

A. Any Non-Pre-Qualified manufacturer who intends to submit a bid on this section of the Specifications, shall submit the following data to the Architect in writing Fourteen (14) days prior to bid date and shall be approved by addendum Seven (7) days prior to bid date. Verbal approval will not satisfy this requirement. Grounds for disqualification shall exist if it is proven that the information submitted is inaccurate or, in the opinion of the Architect, does not satisfy the requirements.

1. Provide a narrative and historical description of the firm from inception, including history of ownership, partnership, incorporation, and/or other organizational information. Include information on the growth of the firm over time to include the number of employees, relocation(s) of the firm, major production equipment purchases and replacements.

2. List the firm's business volume (dollar amount) for the last five (5) fiscal years.

3. Provide a statement that the firm has been in business for a minimum of ten (10) continuous years, and the principals and key personnel that have been engaged in successfully providing procurement, management, installation and commissioning of security detention projects.

4. Provide a list of all employees in a super vision capacity, stating their area of responsibility and their years of experience in that capacity.

5. Submit a list of all projects completed in the last ten (10) years.

6. Submit a list of five (5) projects that this corporation, under its current name, has built in the last five (5) year's comparable in size and construction. Include in this list:
   a. Project Name, Owner, Contract Name, Address and Phone Number.
   b. Project Manager Name, Address and Phone Number.
   c. Using Agency Name, Address and Phone Number.

d. Architect and Engineer of Record Name, Address and Phone Number.
e. General Contractor and/or Construction Manager Name, Address and Telephone Number.
f. For each project listed provide the following:
    1. Name and location of project.
    2. Type of project (state or federal Prison, county or city jail)
    3. Project delivery method (traditional, design/bid/build, design/build, design/build/manage, general construction, construction manager, etc.)
    4. Scope of the Project including total number of cells, total project square footage, type of product and service provided on that project, and the total quantity of the contract.
    5. Date of final completion and occupancy.

7. Submit a list of five (5) projects that this corporation, under its current name, has built in the last ten (10) year's comparable in size and construction that have been in continuous operation for a minimum of five (5) years. Include in this list:
    a. Project Name, Owner, Contact Name, Address and phone number.
    b. Project Manager Name, Address and Phone Number.
    c. Using Agency Name, Address and Phone Number.
    d. Architect and Engineer of Record Name, Address and Phone Number.
    e. General Contractor and/or Construction Manager Name, Address and Telephone Number.
    f. For each project listed provide the following:
        1. Name and location of project.
        2. Type of project (state or federal prison, county or city jail)
        3. Project delivery method (traditional, design/bid/build, design/build, design/build/manage, general construction, construction manager, etc.)

8. Provide an audited financial statement from a recognized accounting firm for the most recent fiscal year.

9. Submit a listing of all projects in which the manufacturer is presently or has been involved in litigation and the status thereof. In addition to this statement, please respond to the following questions A through G. For any "YES" answer to the following questions, please attach a separate sheet, which provides a brief explanation of the facts, names of the parties involved, dollar amount being claimed from your firm, and the present status of the case. Attach explanations of any lawsuit alleging negligent of defective work, or breach of contract on part of the firm. Do not include lien matters, automobile accident cases, or workman's compensation cases:
    a. Has a court issued a judgment of $50,000.00 of more against the firm or its predecessors in the past five (5) years?

        _____ YES _____ NO

b. Has the firm or its predecessors been party to the settlement of a lawsuit with a potential value of $50,000.00 or more?

_____ YES _____ NO

c. Is the firm or its predecessors currently a party to a pending lawsuit with a potential value of $50,000.00 or more?

_____ YES _____ NO

d. In the past five years, has any key person, the firm or its predecessors defaulted on a loan?

_____ YES _____ NO

e. Has the firm of its predecessors or any person of the firm or its predecessors ever been suspended or debarred by a state, federal or municipal agency?

_____ YES _____ NO

f. In the past five (5) years, has the firm or its' predecessors been terminated on or failed to complete any contract?

_____ YES _____ NO

10. Submit a statement that you will conform with the following in regard to project coordination, procurement, schedules, and delivery of materials necessary to complete your scope of work.
    a. The manufacturer must complete the submittal package of all items listed below within three weeks of written notice to proceed.
    b. Detention Equipment, Furnishings, and Equipment shop drawings.
    c. The submitted manufacturers must commit in writing to the following schedule. The Architect or Construction Manager maintains the right to make adjustments to the schedule prior to contract execution.
        1. Maximum of six weeks for the complete shipment of detention items to represent at least 75% of those required with the balance to be delivered to the site at a maximum of 10 weeks.
        2. Maximum of six weeks for the complete shipment of all required embeds.

11. A list of all current work including tentative delivery dates.
    a. A statement from the president of the company as to the company's production capacity and ability to meet the schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS – Pre-approved and selected. Provide as specified for each item. (See paragraph 1.12, "A" for prequalification requirements)

A. Norix Group Inc; West Chicago, Illinois
B. DSM Law Enforcement Products (SpaceSaver)
C. Derby Industries, South Bend, IN
D. JL Industries; Bloomington, MN
E Willoughby Industries, Indianapolis, IN
F. Modern Detention, Cincinnati, OH.
G. Peerless-AV Professional

2.2 EQUIPMENT

A.. Mirror Large (Norix Ironman R565-411)

1. Construction
   a. Mirror shall be formed from 20 gauge type 430 stainless steel polished for high reflectivity.
   b. Mirror frame shall be formed from one piece with raised frame.

2. Installation
   a. Mounting holes shall be extruded to prevent distortion.
   b. Provide six each stainless steel button head screws for mounting mirror.
   c. Mirror embed shall be 3/16" steel plate with ¼" holes for attaching mirror to embed. Embeds shall have countersunk holes for attaching to existing structure.
   d. Masonry or pre-cast anchorage tabs shall be applied to plate for incorporation into new Description construction.

B. Access Panel: (JL Industries HSP)
1. Construction
   a. Welded angle frame shall be fabricated from 3/16" angles to work with bond, steel angles, with corrugated strap anchors and 1" x 1' x 1/8" angle stops on 3 sides. Door to be 28" x 40" or as indicated,
   b. Door panel to be 7-gauge steel with 1-1/4" flange on all four sides.
   c. Equip panel with two (2) # 3FS.
   d. Equip panel with equal to one #12 lock: (refer to Security Hardware spec section 11 19 30)
      1. All locks to be keyed with same key code.

C. Security Grab Bar Suicide Resistant: (Norix Ironman IGS-)

1. Construction:
   a. 3-1/8" dia. 11 gauge stainless steel flanges are heliarc welded to 1-1/2" O.D.
   b. 18 gauge seamless tube.
   c. Suicide preventive 11 gauge closure plate is also heliarc welded to edge between tube and wall.
   d. Sizes: As shown on drawings
      18 (18" length)
      24 (24" length)
      36 (36" length)
      42 (42" length)
2. Installation:
   a. Use bar as template to locate mounting holes.
   b. Attach with furnished torx-head screws.

D. Wall Mounted Stainless Steel Ball Clothes Hooks (Norix Ironman):

1. Types:
   a. 4 Wall Mount towel hook strip. Formed and welded, 14 ga. type 304 Stainless Steel with Brush Satin finish. Bolt to wall. Mounting hardware not included.
   a. Single Wall mount towel hook. Formed and welded, 14 ga. type 304 Stainless Steel with Brush Satin finish. Bolt to wall. Mounting hardware not included.

E. Wall mount Toilet Paper Holder – (Norix ITP-110)

1. Mount where indicated on Drawings. Provide tamper security fasteners for mounting and installation.

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Examine areas and surfaces to receive materials, assemblies and equipment furnished and installed under this section:

1. Verify proper location of embeds, frames and items installed by others.

2. Check rough-ins and field dimensions of building construction.

3. Inspect concrete and masonry to ensure construction within required tolerances.

4. Confirm locations of materials ingress openings in building.

B. Report unsatisfactory conditions to Architect in writing. Do not begin installation of detention equipment until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General Contractor:

1. Provide openings through exterior and interior building walls to accommodate ingress of detention equipment. Coordinate sizes and locations of openings with DEC.

2. Ensure accuracy of building construction, including sizes and locations of beams and columns, concrete and masonry walls, evenness of concrete and dimensional consistency.
   a. Concrete floors and ceilings should be level and true.

b. Where concrete is uneven, chip or grout as required for proper fit between detention equipment steel and concrete?

3. Broom clean, properly light and heat areas of building where detention equipment is to be installed.

4. Prior to installation of electrical and mechanical hardware or locking and operating devices and controls, exterior closing walls should be in place, exterior windows glazed, and roof completely installed to prevent weather damage to components.

3.3 INSTALLATION

A. General:

1. Install fixtures, materials, assemblies and equipment listed in Articles 1.2 and 1.4 in strict compliance with Specifications, Contract Drawings and manufacturers' recommendations and instructions.

2. Provide necessary drawings, setting diagrams or other information required to Contractor responsible for installation of DEC-furnished items to be installed by others.

B. Attachment and connection of detention equipment:

1. Secure detention equipment permanently in place with minimum of exposed fasteners and free from warp, twists, bends, rough edges, cracks or open joints. Exposed fasteners shall be uniform in size, spacing and appearance and shall be tamper-resistant.

2. Punch bolt holes not more than 1/16 inch larger in diameter than bolts to be used. Accurately space and align holes to permit insertion of bolts. When bolts are used, nuts shall be tightly drawn and bolt threads battered to prevent removal.

3. Remove loose scale, rust, oil and other foreign matter from surfaces to be welded. Welds shall show uniform cross-sections, good penetration of base metals, smoothness of weld metal with a minimum of craters, porosity and clinkers.

4. Thoroughly clean burns, welds and welding spatter on detention equipment resulting from fabrication and installation.

5. Welds, which are neat in appearance and evenly spaced, shall not require grinding.

C. Supervision:

1. Work shall be performed under direct supervision of competent, experienced,

factory-trained project superintendent who shall be full-time employee of DEC.

2. DEC's superintendent shall be present at job site during all phases of installation of detention equipment.

3. DEC shall be responsible for conduct and performance of jobsite personnel and shall ensure that Work progresses without serious conflict with related work being performed simultaneously by other trades.

3.4 FIELD QUALITY CONTROL

A. Upon completion of installation of detention equipment and electronic security systems, perform and document detailed quality assurance inspection confirming proper installation and operation of equipment/systems and provide confirmation in writing to Architect. Include written request to Architect to inspect Work.

3.5 DEMONSTRATION

A. Provide designated personnel instruction in proper operation of detention equipment and systems for a period of time not less than three (3) working days.

B. Provide designated maintenance personnel instruction in proper maintenance of detention equipment and systems for a period of time not less than three (3) working days.

END OF SECTION

SECTION 12 36 61 - SOLID SURFACING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Solid surface material countertops.
   2. Solid surface material backsplashes.
   3. Solid surface material end splashes.
   4. Solid surface material apron fronts.
   5. Solid surface material sinks.
   6. Solid surface material window sills.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials and sinks.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
   1. Show locations and details of joints.
   2. Show direction of directional pattern, if any.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.7 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Corian, DuPont
      b. Living Stone

- Integral Sink Bowls: Comply with CSA B45.5/IAPMO Z124.
- Colors and Patterns: Match Architect's samples.
- Particleboard: ANSIA208.1, Grade M-2-Exterior Glue.
- Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP & WINDOW SILL FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
   1. Grade: Custom.

B. Configuration:
   1. Front: Beveled, 1/8” radiused.
   2. Backsplash: Beveled, 1/8” radiused.

C. End Splash: Matching backsplash. Countertops: 1/2-inch- thick, solid surface material.

D. Countertops: 1/2-inch- thick, solid surface material laminated to 3/4-inch- thick particleboard with blocking.

E. Backsplashes: 1/2-inch- thick, solid surface material.

F. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
   1. Fabricate with loose backsplashes for field assembly.
   2. Install integral sink bowls in countertops in the shop.

G. Joints: Fabricate countertops without joints.

H. Joints: Fabricate countertops in sections for joining in field.
   1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
   2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

I. Cutouts and Holes:
   1. Undercounter Plumbing Fixtures: Make cutouts for fixtures using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
   2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
   3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.
   1. Adhesives shall have a VOC content of 70 g/L or less.
   2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

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

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten sub tops to cabinets by screwing through sub tops into corner blocks of base cabinets. Shim as needed to align sub tops in a level plane.

D. Secure countertops to sub tops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

1. Seal edges of cutouts in particleboard sub tops by saturating with varnish.

I. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61