



NEW CASTLE COUNTY VO-TECH SCHOOL DISTRICT

PAUL M. HODGSON
VOCATIONAL TECHNICAL HIGH SCHOOL
2575 Glasgow Avenue, Newark, DE 19702

PROJECT MANUAL

BSA+A PROJECT #22.011

Contract No. NCC2401D

Volume 2
Divisions 02 through 13

BID PACKAGE E – Fieldhouse, Athletic Fields, and Storage Buildings
ISSUED FOR BID

November 04, 2025

ABHA | BSA+A

PROJECT MANUAL

NEW CASTLE COUNTY VO-TECH SCHOOL DISTRICT PAUL M. HODGSON VOCATIONAL-TECHNICAL HIGH SCHOOL

Contract No. NCC2401D

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**ISSUED BOR BID
November 04, 2025**

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The following previously issued Bid Package documentation is included by reference:

- BPB Sitework and Utilities dated 25 May 23
 - Addendum #1 dated 1 Aug 23
 - Addendum #2 dated 7 Aug 23
 - Addendum #3 dated 10 Aug 23

- BPC Foundations and Structures 31 Aug 23
 - Addendum #1 dated 29 Sept 23
 - Addendum #2 dated 11 Oct 23
 - Addendum #3 dated 12 Oct 23
 - Addendum #4 dated 20 Oct 23
 - Addendum #5 dated 23 Oct 23

- BPD Building Envelop & Fit-Out dated 5 Dec 23
 - Addendum #1 dated 28 Dec 23
 - Addendum #2 dated 12 Jan 24
 - Addendum #3 dated 19 Jan 24
 - Addendum #4 dated 24 Jan 24

- BPD.1 Building Envelope & Fit-Out (re-bid) dated 11 March 24
 - Addendum #1 dated 5 April 24
 - Addendum #2 dated 11 April 24

- BPD.2 Sitework, Concrete, and Paving Specifications dated 11 Oct 24
 - BPD.2 Sitework, Concrete, and Paving Drawings dated 18 Oct 24
 - BPD.2 Sitework, Concrete, and Paving Attachment A dated 11 Oct 24
 - Addendum #1 dated 17 Jan 25
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SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of site improvements including paving, concrete and bituminous sidewalks, curb and gutter and fencing.
- 2. Disconnecting, capping or sealing, and abandoning site utilities in place.
- 3. Disconnecting, capping or sealing, and removing site utilities.
- 4. Demolition and removal of site improvements to a depth to avoid conflict with new construction or site work.
- 5. Protection of site work and adjacent structures.
- 6. Pollution control during demolition.

- B. Related Sections:

- 1. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities..

- C. Delaware Department of Natural Resources and Environmental Control (DNREC) Sediment and Erosion Control Handbook.

1.3 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
- B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and protect against damage. Deliver to Owner's designated storage area.

- C. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Engineer, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations or as directed.

1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site and legally disposed of at an offsite location.

1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, unless otherwise indicated
- B. Proposed dust-control measures
- C. Proposed noise-control measures.
- D. Schedule of demolition activities indicating the following:
 - 1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity.
 - 2. Dates for shutoff, capping, and continuation of utility services.
- E. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by demolition operations.
- F. Record drawings at Project closeout according to Division 1 Section "Contract Closeout."
 - 1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.
- G. Landfill records for record purposes indicating receipt and acceptance of hazardous wastes, as applicable, by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.

- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Pre-demolition Conference: Conduct conference at Project site to comply with pre-installation conference requirements of Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

- A. Utility Locator Service: Notify Miss Utility (1-800-282-8555) for area where Project is located before beginning earth moving operations.
- B. Hazardous Materials: It is not expected that hazardous materials such as asbestos, PCBs, etc. will be encountered in the course of this Contract. If any suspect materials are encountered, do not disturb the materials. Immediately notify the Engineer and the Owner.
- C. Storage or sale of removed items or materials on-site will not be permitted.

1.8 SCHEDULING

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

3.2 UTILITY SERVICES

- A. Maintain existing utilities to remain in service and protect them against damage during demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide not less than seven (7) days' notice to Owner of shutdown of service is required. Provide temporary services during interruptions to existing utilities as specified in the contract documents and as acceptable to Owner and to governing authorities.
- B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services as required.

3.3 PREPARATION

- A. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner. Provide alternate routes around closed or obstructed traffic ways as required.
- B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.
 - 1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 2. Protect existing site features, irrigation system, utilities, appurtenances, and landscaping to remain.
 - 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

3.4 EXPLOSIVES

- A. Explosives: Use of explosives will not be permitted for use on this project.

3.5 POLLUTION CONTROLS

- A. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

- B. The Contractor shall take appropriate action to check the spread of dust and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as ice, flooding, or pollution.

3.6 DEMOLITION

- A. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
- B. Break up and completely remove concrete paving, sidewalks, curb and gutter, etc., and hot mix asphalt and base material, unless otherwise shown to remain.
- C. Remove indicated existing structures to 18 inches below proposed finished grade or as required to accommodate new construction.
- D. Filling Below-Grade Areas: Completely fill below-grade areas and voids resulting from demolition of structures and pavements with soil materials according to requirements specified in Division 2 Section "Earthwork."
- E. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Title to materials and equipment to be removed, except as specified otherwise, is vested in the Contractor upon receipt of notice to proceed. The Owner will not be responsible for the condition or loss of, or damage to, such property after notice to proceed.
- B. Remove and transport debris and rubbish in a manner that will prevent spillage on streets or adjacent areas.
- C. Comply with Federal, State, and Local hauling and disposal regulations.

END OF SECTION 02 41 00

SECTION 02 41 16 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. Removal of below-grade construction.
3. Disconnecting, capping or sealing, and removing site utilities.

B. Related Sections:

1. Section 31 10 00, Site Clearing, for site clearing and removal of above-grade and below-grade site improvements not part of building demolition.
2. Section 31 20 00, Earthmoving, for backfilling and compaction of below-grade voids.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. The following items remain the property of the Owner. Carefully salvage in a manner to prevent damage and promptly return to Owner.
 1. Cornerstones and date stones.
 2. Commemorative plaques.
 3. Other historic items, relics, antiques, and similar objects including, but not limited to, s and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified refrigerant recovery technician.

- B. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - 2. Shutoff and capping of utility services.
- C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
- D. Pre-demolition Conference: Conduct conference at Project Site.
 - 1. Review structural load limitations of existing structures.
 - 2. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review procedures for noise control and dust control.

1.7 PROJECT CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Owner assumes no responsibility for buildings and structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as far as practical.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb. Immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. On-site storage or sale of removed items or materials is not permitted.

PART 2 - PRODUCTS (NOT USED)

2.1 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 31 20 00, Earthmoving.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

3.2 PREPARATION

- A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.
- B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
- C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of demolition.
- D. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.

3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
 - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated.
 - 1. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 - 2. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 3. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 - 4. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings completely. Use methods required to complete the Work within limitations of governing regulations and as follows.
 - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 - 2. Maintain fire watch during and for at least two hours after flame cutting operations.
 - 3. Maintain adequate ventilation when using cutting torches.
 - 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide

alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

- C. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

- C. Salvage: Items to be removed and salvaged are indicated below.

1. Commemorative plaque(s).
2. Cornerstones and date stones.

- D. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

- E. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

3.6 SITE RESTORATION

- A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 31 20 00, Earthmoving.

- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.9 CLEANING

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

END OF SECTION 02 41 16

SECTION 03 30 00
CAST-IN-PLACE 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 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. Suspended slabs.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Samples: For waterstops and vapor retarder.
- E. Welding certificates.

- F. Qualification Data: For Installer, manufacturer, testing agency.
- G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates.
- H. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Waterstops.
 - 6. Curing compounds.
 - 7. Floor and slab treatments.
 - 8. Bonding agents.
 - 9. Adhesives.
 - 10. Vapor retarders.
 - 11. Semirigid joint filler.
 - 12. Joint-filler strips.
 - 13. Repair materials.
- I. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.
- J. Field quality-control test reports.
- K. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
 - D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
 - E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
 - F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 1. ACI 301, "Specification for Structural Concrete,"
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
 - H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, [curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, steel reinforcement installation, floor and slab flatness and levelness measurement, and concrete protection.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
 - B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420) , deformed bars, assembled with clips.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.

- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C. Provide at exterior concrete slabs.
1. Products:
 - a. Boral Material Technologies, Inc.; Boral BCN.
 - b. Euclid Chemical Company (The); Eucon CIA.
 - c. Grace Construction Products, W. R. Grace & Co.; DCI.
 - d. Master Builders, Inc.; Rheocrete CNI.
 - e. Sika Corporation; Sika CNI.
- D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete. Provide at exterior concrete slabs.
1. Products:
 - a. Axim Concrete Technologies; Catexol 1000CI.
 - b. Boral Material Technologies, Inc.; Boral BCN2.
 - c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
 - d. Master Builders, Inc.; Rheocrete 222+.
 - e. Sika Corporation; FerroGard-901.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
1. Manufacturers:
 - a. Bayer Corporation.
 - b. ChemMasters.
 - c. Conspec Marketing & Manufacturing Co., Inc.; a Dayton Superior Company.
 - d. Davis Colors.
 - e. Elementis Pigments, Inc.
 - f. Hoover Color Corporation.
 - g. Lambert Corporation.
 - h. Scofield, L. M. Company.

- i. Solomon Colors.
2. Color: As selected by Architect from manufacturer's full range.

2.7 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).
 1. Products:
 - a. Colloid Environmental Technologies Company; Volclay Waterstop-RX.
 - b. Approved equal

2.8 VAPOR RETARDERS

- A. Vapor Barrier shall have all of the following qualities:
 1. Maintain permeance of less than 0.01 Perms [grains/(ft² * hr * inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 2. Other performance criteria:
 - a. Strength: ASTM E1745 Class A.
 - b. Thickness: 15 mils minimum
 3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
- B. Vapor Barrier Products: 15 mil plastic sheet - single ply vapor barrier.
 1. Stego Wrap (15 mil) Vapor Barrier by STEGO INDUSTRIES LLC, San Clemente, CA (877) 464-7834 www.stegoindustries.com
 2. Griffolyn 15 mil Green Vapor Barrier by Reef Industries, Inc.
 3. VaporBlock 15 by Raven Industries, Inc.
 4. Viper II by ISI Building Products.

C. ACCESSORIES

1. Seam Tape
 - a. Tape must have the following qualities:
 - 1) Water Vapor Transmission Rate ASTM E 96: 0.3 perms or lower
2. Vapor Proofing Mastic
 - a. Mastic must have the following qualities:
 - 1) Water Vapor Transmission Rate ASTM E 96: 0.3 perms or lower
3. Pipe Boots
 - a. Provide manufacturer's supplied pipe boot system or construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

2.9 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Treatment: Provide at all exposed concrete surfaces to be treated to harden, seal and densify exposed concrete. Clear, chemically reactive, waterborne solution of

inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products:
 - a. Dayton Superior Corporation; Day-Chem Sure Hard.
 - b. Euclid Chemical Company (The); Euco Diamond Hard.
 - c. L&M Construction Chemicals, Inc.; Seal Hard.
 - d. Meadows, W. R., Inc.; Liqui-Hard.

- B. Stained Hardener with matching cure/sealer - Pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement. Placing of hardener is followed by manufacturer's recommended water membrane-forming cure and seal: ASTM C 309

1. Products:
 - a. L&M Construction Chemicals, Inc.; Quartz Plate FF Hardener followed by Dress & Seal WB 30 per manufacturer's recommendations and specifications.
 - b. Scofield, L. M. Company; Lithochrome Color Hardener followed by Lithochrome Colorwax in matching color per manufacturer's recommendations and specifications.

2.10 CURING MATERIALS

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

1. Products:
 - a. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
 - b. Dayton Superior Corporation; Sure Film.
 - c. Euclid Chemical Company (The); Eucobar.
 - d. L&M Construction Chemicals, Inc.; E-Con.
 - e. Meadows, W. R., Inc.; Sealtight Evapre.
 - f. Sika Corporation, Inc.; SikaFilm.

- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

- D. Water: Potable.

- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products:

- a. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
- b. Euclid Chemical Company (The); Kurez DR VOX.
- c. L&M Construction Chemicals, Inc.; L&M Cure R.
- d. Meadows, W. R., Inc.; 1100 Clear.
- e. Tamms Industries, Inc.; Horncure WB 30.

2.11 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Reglets: Fabricate reglets of not less than 0.0217-inch- (0.55-mm-) thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- D. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.12 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.13 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 - 2. Silica Fume: 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement at exterior conditions and 0.30 percent by weight of cement at interior conditions.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup. Coordinate color and location with Architect.

2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4500 psi (31.0 MPa) at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm).
 - 4. Exposure Class: F2, S0, C1, P0
- B. Foundation Walls: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4500 psi (31.0 MPa) at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm).
 - 4. Exposure Class: F2, S0, C1, P0

- C. Slabs-on-Grade - Interior: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm).
 4. Exposure Class: F0, S0, C1, P0
- D. Slabs-on-Grade – Exterior (Exposed to Exterior Conditions): Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm).
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
 5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.
 6. Exposure Class: F2, S0, C2, P0
- E. Suspended Slabs: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3500 psi (24.1 MPa) at 28 days.
 2. Minimum Cementitious Materials Content: 470 lb/cu. yd. (309 kg/cu. m).
 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm). For pumpable concrete, slumps may be increased by 3 inches.
 4. Exposure Class: F0, S0, C0, P0

2.15 FABRICATING REINFORCEMENT

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

2.16 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
 2. Class C, 1/2 inch (13 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

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

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

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

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

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

1. Apply to concrete surfaces not exposed to public view.

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

1. Apply to concrete surfaces exposed to public view, to be covered with a coating or covering material applied directly to concrete.

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

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.

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

- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated, exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface and per ACI 117 “Specification For Tolerances For Concrete Construction & Materials”:
 - a. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 25 as a minimum. Coordinate and specify minimum F(F) and F(L) values with flooring manufacturer during concrete pre-installation conference. Note: Flooring manufacturer may require very flat surface classification (F(F) 45; F(L) 35) or super flat surface classification (F(F) 60 ; F(L) 40). Coordinate locations and requirements prior to installation.
 - b. Provide maximum floor variation of 1/8” in 10’ and 1/16” in 1’ for terrazzo floor tile area or requirement as indicated by product manufacturer, whichever is more stringent.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

- c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one-part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in

- depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
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. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 7. Compression Test Specimens: ASTM C 31/C 31M.

- a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
- a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing. Values to be documented and provided to Architect and Flooring Manufacturer prior to placing flooring.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Ground-face concrete block.
- C. Clay facing brick.
- D. Mortar and grout.
- E. Reinforcement and anchorage.
- F. Lintels.
- G. Accessories.

1.02 RELATED REQUIREMENTS

- A. Division 1 - Administrative Requirements: Preconstruction meeting.
- B. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
- C. Section 07 13 00 - Sheet Waterproofing: Waterproofing masonry surfaces.
- D. Section 07 21 00 - Thermal Insulation: Insulation for cavity spaces.
- E. Section 07 26 40 - Spray Polyurethane Foam Insulating Air Barrier
- F. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- G. Section 07 84 00 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- H. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2022.
- F. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2023.
- G. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- I. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- J. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2023.
- K. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- L. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.

- M. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- N. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.
- O. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- P. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2022.
- Q. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2023a.
- R. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.
- S. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
- T. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.
- U. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.
- V. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

- A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, masonry accessories, and cleaning products including application .
- B. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, and accessories for special shapes.
- C. Samples: Submit two samples of decorative block and facing brick units to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements, including referenced material standards and fire ratings.
- E. Shop Drawings: Provide shop drawings of vertical wall reinforcement and bond beam reinforcement. Submit, with copies to the Owner's Independent Testing and Inspection Agency, shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Show details of construction, including dimensioned drawings, plans, elevations, sections, and details of components to be incorporated into Work including, but not limited to, the following:
 - 1. Flashing System: Large-scale details for each element of flashing system showing layout, profiles, methods of joining, and anchorage details; including lintel units, shelf units, corner units, end dam units, drip edges, conditions showing interface and relationship to adjacent materials, and other special applications.
 - 2. Fabricated Flashing: Detail corner units, end-dam units, drip edges, and other special applications.
 - 3. Anchors, Ties, and Accessories: Show sizes, coursing, and locations.
 - 4. Reinforcing: For masonry reinforcing bars; comply with ACI 315, "Details and Detailing of Concrete Reinforcement" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement. Show elevations of reinforced walls.

1.05 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For each type of masonry unit, cementitious materials, and accessories required. Include data on material properties material test reports substantiating compliance with requirements. For brick, include test report for efflorescence according to ASTM C 67.

1. Provide test reports based on testing within previous two years.
 - B. Material Certificates: Submit material certificates for the following, signed by manufacturer and Contractor. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.
 1. Each type of masonry unit.
 2. Cementitious materials. Include brand, type, and name of manufacturer. Provide certifications from manufacturer that no admixtures have been added to cementitious materials.
 3. Grout mixes. Include description of type and proportions of ingredients.
 4. Each material and grade indicated for reinforcing bars.
 5. Each type and size of joint reinforcement.
 6. Each type and size of anchors, ties, and metal accessory.
 - C. Mix Designs: Submit material test reports for the Owner's Independent Testing and Inspection Agency, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements.
 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content. Include description of type and proportions of mortar ingredients.
 2. Include test reports, according to ASTM C 1019 for grout mixes required to comply with compressive strength requirement. Include description of type and proportions of grout ingredients.
 - D. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.
 - E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Extra Pre-Faced Units: 50 of each type, size, and color combination.
- 1.06 QUALITY ASSURANCE
- A. Installer Qualifications: The unit masonry work to be by a single firm specializing in exterior wall masonry work, for a period of not less than 5 years, so that there will be undivided responsibility in this single firm for such work.
 1. The Installer must be experienced with work comparable to the work shown and specified and who has completed projects with a successful in-service performance for a period of not less than 5 years.
 2. The Installer shall engage experienced and qualified subcontractors to perform any part of the masonry work which he is not equipped or qualified to perform properly with his own forces.
 - B. Standards: Comply with the applicable provisions and recommendations of the following standards below, where standards conflict, the more stringent shall apply, and where a conflict between any stated standard and a project specific requirement of the specifications arise, the more stringent provision shall prevail.
 1. National Concrete Masonry Association (NCMA): "TEK" Information Series.
 2. American Concrete Institute (ACI):
 - a. ACI 530/ASCE 5/TMS 402: "Building Code Requirements for Masonry Structures."
 - b. ACI 530.1/ASCE 6/TMS 602: "Specifications for Masonry Structures."

3. Brick Industry Association (BIA) "Technical Notes on Brick Construction."
 4. Underwriters Laboratories, Inc. (UL) "Fire Resistance Ratings."
 5. American Society for Testing and Materials (ASTM) E 2266 "Standard Guide for Design and Construction of Low-Rise Frame Building Wall Systems to Resist Water Intrusion."
- C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, through one source from a single manufacturer for each product required.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. Owner's Independent Testing and Inspection Agency: The Owner will engage a qualified independent testing and inspection agency to perform preconstruction testing indicated below for field quality control. Payment for these services will be made by Owner. Independent testing agency to coordinate submittal of "Special Inspections" testing documentation for State of Delaware (State) review and approval.
1. The Contractor is responsible for the expense of testing or inspection resulting as a consequence of the following:
 - a. Work not evidencing compliance with this specification.
 - b. Testing to verify the adequacy of work done without prior notice, improper supervision, or contrary to standard construction practice.
 2. Contractor's Responsibilities:
 - a. Furnish labor required to facilitate testing.
 - b. Provide materials, samples and access to materials as required for testing.
 - c. Provide a complete set of shop and erection drawings, including revisions to previous Architect reviewed submittals.
 3. Owner's Independent Testing and Inspection Agency's Duties:
 - a. The Owner's Independent Testing and Inspection Agency shall conduct the following tests and inspections, interpret them, evaluate the results for compliance with the specifications, and report the findings to the Architect, Owner, Contractor, and Local Building Authority, as their interests may appear.
 - 1) Inspection and testing shall be in accordance with ACI requirements for masonry (ACI 530 and ACI 503.1) for the following inspections:
 - (a) Observation, sampling and placing of masonry units used in all reinforced masonry construction.
 - (b) Inspection reports during reinforced masonry erection.
 - (c) Observations of reinforcement condition, size and placement for compliance with ACI 530.
 - (d) Ambient temperature during reinforced masonry erection.
 - (e) Inspection of reinforced masonry materials to verify compliance with ACI 530.1.
 - (f) Prism testing of masonry.
 - (g) Observation of proportioning, mixing, consistency of mortar and grout for compliance with ACI 530.1.
 - (h) Observation of application of mortar, grout and masonry units for compliance with ACI 530.1.
 - (i) Observation of installation of anchors for compliance with ACI 530.
 - b. Tests shall be conducted at the start of the job, using materials and mixes sampled at point of deposit.

- c. Testing of Mortar: The Owner’s Independent Testing Laboratory shall verify mix consistency by daily testing in accordance with ASTM C780. Test shall establish specific and overall performance characteristics of the mortar system. Test reports shall be submitted to the Owner / Architect for review under the provisions of the Division 01 section under “General Requirements”.
 - d. Test of grout for reinforced masonry for compliance with ASTM C 476 requirements for the types specified and strength shown, conduct and report the following:
 - 1) Compressive strength (ASTM C 1019); lab cure and break at a time increment of one at 7 days, and two at 28 days; a minimum of 1 field test shall be made for each 5000 square feet of reinforced CMU wall. Make no less than 3 tests.
 - e. Preliminary Test of Concrete Masonry Design Strength: With sufficient time, and not less than 28 days prior to the start of reinforced masonry construction, test for the compressive concrete masonry design strength (f'_m) as specified. The value of f'_m shall be determined by tests of masonry assemblies (prisms) in accordance with ACI 530.1. Not less than five prisms shall be taken as 8 inches for reinforced CMU.
 - f. Field Tests of Concrete Masonry Design Strength: During construction, the value of the compressive concrete masonry design strength (f'_m) shall be verified by field tests in accordance with the ACI and ASTM standards. A minimum of one field test shall be made for every 5000 square feet of reinforced CMU wall. Not less than three prisms shall be made for each field test. The thickness of the prisms shall be taken as 8 inches for the reinforced CMU.
- F. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
 - 1. Deliver masonry veneer units to the jobsite on covered banded pallets with cardboard between layers. Store pallets in single stacks on level ground and cover with waterproof covering to protect the units from inclement weather. Handle masonry veneer units carefully to avoid breakage and damage to the finished surfaces.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided. During cold weather stockpile aggregates so that it may be possible to heat them for use in mixing mortar in compliance with ACI recommendations for cold weather masonry practices.
- E. Deliver pre-blended dry mortar mix, if used for the project, in moisture-resistant containers designed for use with dispensing silos. Store pre-blended dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

- F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil. Do not use metal reinforcing or ties having loose rust or other coatings, including ice, that will reduce rust or destroy bond.

1.08 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress. Prevent excess moisture from entering work in progress.
 - 1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.
 - 2. Protect door and window frames and exposed metal flashings from damage.
- B. Stain Prevention: Prevent mortar and soil from staining the face of masonry to be left exposed. Immediately remove mortar and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use metal reinforcing or ties having loose rust or other coatings that will reduce or destroy bond. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6 and ACI 530/ASCE 5 and the following requirements:
 - 1. If air temperature falls below 40 deg F, mixing water shall be heated.
 - 2. If the air temperature falls between 20 deg F and 32 deg F inclusively, sand and water shall be heated.
 - 3. If the air temperature falls below 20 deg F, in addition to the requirements of the preceding sub-paragraph, masonry units shall be heated, and heated enclosures shall be used with a minimum temperature of 40 deg F.
 - 4. Masonry shall be protected from freezing for 24 hours after laying.
- D. Hot-Weather Requirements: When ambient temperature exceeds 100 deg F (38 deg C), or 90 deg F (32 deg C) with a wind velocity greater than 8 mph (13 km/h), do not spread mortar beds more than 48 inches (1200 mm) ahead of masonry. Set masonry units within one minute of spreading mortar. Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.09 DEFINITIONS

- A. Exterior: Areas exposed to the elements and areas located in unconditioned spaces
- B. Interior: Areas located in conditioned spaces

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches (400 by 200 mm) and nominal depths as indicated on drawings for specific locations.

2. Special Shapes: Provide non-standard blocks configured for corners, lintels, control joint edges, jambs, sash, and other detailed conditions.
 3. Load-Bearing Units: ASTM C90, lightweight.
 - a. Hollow block, as indicated.
 - B. Decorative Concrete Masonry Units
 1. Ground Face Block: ASTM C 90:
 - a. Size:
 - 1) Size: Standard units with nominal face dimensions of 16 x 8 inches (400 x 200 mm) and nominal depths as indicated on the drawings for specific locations.
 - b. Pattern and Texture:
 - 1) Pattern: ground face finish; ground face units sealed.
 - c. Color: To be selected from full range of manufacturer's standard colors.
 - 1) Ground Face Type 1: York Building Products, Gemstone "Ash."
 - 2) Ground Face Type 2: York Building Products, Gemstone "Flint."
 2. Shapes: Provide special shapes indicated, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated. Special shapes include but are not limited to:
 - a. Corner units
 - b. Sill units
 - c. Water table units
 3. Manufacturers:
 - a. Basis of Design Ground Face Product: York Building Products, Gemstone: www.yorkbuilding.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - C. Units with Integral Water Repellent: Provide exterior concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
 1. Performance of Units with Integral Water Repellent:
 - a. Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
 - 1) No water visible on back of wall above flashing at the end of 24 hours.
 - 2) No flow of water from flashing equal to or greater than 0.032 gallons per hour (0.05 L per hour) at the end of 24 hours.
 - 3) No more than 25 percent of wall area above flashing visibly damp at end of test.
 - b. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
 - c. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
 2. Use only in combination with mortar that also has integral water repellent admixture.
 3. Use water repellent admixtures for masonry units and mortar by a single manufacturer.
- ## 2.02 BRICK UNITS
- A. Facing Brick: ASTM C216, Type FBS and FBX (as noted), Grade SW.
 1. Basis of Design Manufacturer: Glen Gery, Sioux City Brick: www.glengery.com.
 - a. Color A: Granite Red Smooth Ironspot
 - 1) Actual size: 11-5/8" long x 3-5/8" high, x 3-5/8" deep.
 - 2) Provide Type FBX units.
 - b. Color B: Blue Ironspot Smooth
 - 1) Actual size: 7-5/8" long x 2-1/4" high, x 3-5/8" deep.
 - 2) Provide Type FBS units.
 2. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect:

- a. Corner brick units (custom angle).
- b. Soldier course units with solid corners.
- c. Soldier course units with chamfered face.
3. Other approved manufacturers, subject to compliance with requirements:
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
 - b. Subject to compliance with requirements, the following manufacturers are also approved:
 - 1) Color A: Canada Brick, Varsity Smooth Ironspot
 - 2) Color B: Watsontown Brick, Manhattan Series, Coal KT Clear

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: not permitted.
- B. Portland Cement: ASTM C150/C150M, Type I or Type II, without air entrainment.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Aggregate: ASTM C144: sand.
- E. Grout Aggregate: ASTM C404.
- F. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 1. Color(s): As selected by Architect from manufacturer's full range.
 - a. Basis of Design mortar color: Work-Rite WR-2062 Smoke.
- G. Water: Clean and potable.
- H. Accelerating Admixture: Not permitted.
- I. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
 1. Use only in combination with concrete masonry units manufactured with integral water repellent admixture.
 2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
 3. Meet or exceed performance specified for water repellent admixture used in masonry units.
 - a. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
 - b. Master Builders, Inc.; Rheopel
 - c. Amerimix, an Oldcastle brand; AMX 410: www.amerimix.com.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
 1. Blok-Lok Limited: www.blok-lok.com.
 2. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
 3. WIRE-BOND www.wirebond.com/#sle.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa), deformed billet bars; uncoated.
- C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- D. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch

(25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure. . Provide in lengths of not less than 10 feet (3 m),with prefabricated corner and tee units.

- E. Multiple Wythe Joint Reinforcement: Truss type; fabricated with moisture drip; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/153M, Class B; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure. Provide in lengths of not less than 10 feet (3 m),with prefabricated corner and tee units.
- F. Adjustable Multiple Wythe Joint Reinforcement: Truss type with adjustable ties spaced at 16 in (406 mm) on center ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/153M, Class B; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods and adjustable components of 0.1875 inch (4.8 mm) wire; width of components as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage from each masonry face. Provide in lengths of not less than 10 feet (3 m),with prefabricated corner and tee units.
 - 1. Vertical adjustment: Not less than 3-1/2 inches (89 mm).
- G. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch (16 mm) of mortar coverage from masonry face.
 - 1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch (6.3 mm) thick, with trapezoidal wire ties 0.1875 inch (4.75 mm) thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 2. Firewall break-away ties, steel to masonry: Provide break-away/melt-away connectors manufactured with metals having melting points lower than structural steel (800°F [427°C]).
- H. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch (4.8 mm) thick, adjustable, eye and pintle type, stainless steel, sized to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in (32 mm).
- I. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, Stainless Steel Wire: ASTM A 580/A 580M, AISI Type 304 and / or Stainless Steel Sheet: ASTM A 167, A 240, or A 666, AISI Type 316..
 - 1. Anchor plates: Not less than .093 inch (2.3 mm) thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
 - 2. Pintles: Trapezoidal, or rectangular shape shape, 0.1875 inch (4.75 mm) thick.
 - 3. Vertical adjustment: Not less than 2 inches (50 mm).
 - 4. Manufacturers:
 - a. HB-200-X anchor by Hohmann & Barnard, Inc.(/www.h-b.com)
 - 5. Stacked bond: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch (3.8 mm) diameter.

2.05 FLASHINGS

- A. See Section 07 62 00 - Sheet Metal Flashing and Trim .

2.06 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding.
- C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, duel level, trapezoidal shape and designed to prevent mortar droppings from clogging cavity weeps and allow proper cavity drainage.
 - 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
 - a. Manufacturers:
 - 1) Mortar Net Solutions; MortarNet with Insect Barrier: www.mortarnet.com.
 - b. Locations: At flashing locations in brick veneer walls.
- D. Cavity Weeps : Polyester mesh.
- E. Color(s): As selected by Architect from manufacturer's full range.
- F. Elastomeric Masonry Coating: Elastomeric acrylic coating for dampproofing interior wythe of masonry site walls.
 - 1. Product and manufacturer:
 - a. FE Coat manufactured by BASF.
 - b. SherLastic manufactured by Sherwin-Williams
- G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
 - 1. Prosoco SureKlean Vana Trol.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- H. Steel Shelf Angles and Lintels: galvanized, see Section 05 12 00 - Structural Steel Framing and Section 05 50 00 - Metal Fabrications.
- I. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142inch (3.6mm) steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

2.07 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Masonry below grade and in contact with earth: Type S.
 - 2. Exterior, loadbearing masonry: Type S.
 - 3. Exterior, non-loadbearing masonry: Type N.
 - 4. Interior, loadbearing masonry: Type S.
 - 5. Interior, non-loadbearing masonry: Type N.
- B. Mortar Type S: minimum 1800 psi, ASTM C 270.
- C. Mortar Type N: One (1) part Portland Cement, one (1) part hydrated lime, and six (6) parts sand.
- D. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- E. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm). Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 of ACI 530.1/ASCE 6/TMS 602 and ACI 530/ASCE 5 for dimensions of grout spaces

and pour height. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

- F. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- G. Mixing: Use mechanical batch mixer and comply with referenced standards.

2.08 SOURCE QUALITY CONTROL

- A. Owner may engage a qualified independent testing agency to perform source quality-control testing indicated below. Payment for these services will be made by Owner.
- B. Brick Tests: For each type and grade of brick indicated, units will be tested according to ASTM C 67.
- C. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C 140.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 INSTALLATION - GENERAL

- A. Comply with ACI 530.1/ASCE 6, ACI 530/ASCE 5, and other requirements indicated applicable to each type of installation included in Project.
- B. Use full size units without cutting, if possible.
 - 1. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges.
 - 2. Allow units to dry before laying unless wetting of units is specified.
 - 3. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets as they are placed.
- D. Wetting of Brick:
 - 1. Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67.
 - 2. Allow units to absorb water so they are damp but not wet at time of laying.
- E. Cover tops of all partially completed walls at end of day to protect completed work and prevent water from entering the cavity.
- F. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.04 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.05 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running and stack bond, as indicated.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
 - 3. Mortar Joints: Concave.
- D. Brick Units:
 - 1. Bond: Stacked.
 - 2. Coursing: Two units and two mortar joints to equal 8 inches (200 mm).
 - 3. Mortar Joints: Concave.

3.06 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners.
- G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- I. Cut mortar joints flush where wall tile is scheduled, cement parging is required, or resilient base is scheduled. Use square outside corners where wall tile is scheduled or corner guards are shown. Use bullnose outside corners at typical outside CMU corner.
- J. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- K. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.07 WEEPS

- A. Install weeps in veneer and cavity walls at 16 inches (406 mm) on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
- B. Place weeps directly on flashing.
- C. Do not strike mortar across bottom of weep.
 - 1. If mortar is struck across weep, remove and replace weep.

3.08 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

- C. Install cavity mortar diverter at base of cavity full width of air space and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.
- 3.09 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY
- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.
 - B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
 - C. Place continuous joint reinforcement in first and second joint below top of walls.
 - D. Lap joint reinforcement ends minimum 6 inches (150 mm).
 - E. Reinforce joint corners and intersections with strap anchors 16 inches (400 mm) on center.
 - F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 16 inches (400 mm) horizontally and 16 inches (400 mm) vertically.
- 3.10 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY
- A. Install horizontal joint reinforcement 16 inches (400 mm) on center.
 - B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
 - C. Place continuous joint reinforcement in first and second joint below top of walls.
 - D. Lap joint reinforcement ends minimum 6 inches (150 mm).
- 3.11 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER
- A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches (400 mm) on center vertically and 16 inches (400 mm) on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.
 - B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches (400 mm) on center vertically and 16 inches (400 mm) on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.
 - C. Stacked Bond Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.
- 3.12 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY
- A. Install horizontal joint reinforcement 16 inches (400 mm) on center.
 - B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
 - C. Place continuous joint reinforcement in first and second joint below top of walls.
 - D. Lap joint reinforcement ends minimum 6 inches (150 mm).
 - E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
 - F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 16 inches (400 mm) horizontally and 16 inches (400 mm) vertically.

3.13 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up flashing ends at least 1 inch (25.4 mm), minimum, to form watertight pan at nonmasonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends with a minimum of two beads of continuous sealant from leading edge of horizontal surface across and up entire height of vertical/sloped surface. Seal penetrations of flashing before covering with mortar.
 - 4. Fold flashing to create end dams at discontinuous ends. Turn up one course.
 - 5. Seal penetrations of flashing materials at cast stone and other anchors with compatible sealant or mastic.
- B. Terminate flashing up 8 inches (203 mm) minimum on vertical surface of backing:
 - 1. Install vertical leg of flashing behind water-resistive barrier over backing.
 - 2. Anchor vertical leg of flashing into backing with a termination bar and sealant.
- C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
- D. Extend metal flashings flush with the exterior face of masonry. Install flashing in two beads of butyl joint sealer Type 3 below flashing to prevent moisture migration under flashing. Refer to Section 07 92 00 - Joint Sealants.
- E. Support flexible flashings across gaps and openings.
- F. Lap end joints of metal flashings at least 6 inches (152 mm) and seal watertight with Sealant Type 3.
 - 1. Refer to Sections 07 62 00 - Sheet Metal Flashing and Trim and 07 92 00 - Joint Sealants.

3.14 LINTELS

- A. Refer to structural drawings for lintel requirements.
- B. Install loose steel lintels over openings.
- C. Maintain minimum 8 inch (200 mm) bearing on each side of opening.

3.15 GROUTED COMPONENTS

- A. Reinforce bond beams as noted on the Contract Drawings.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches (300 mm) either side of opening.
- F. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.16 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Size control joints 3/8 inch wide and deep.
- D. Form expansion joint as detailed on drawings.

3.17 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames, window frames, anchor bolts, plates, and louvers and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches (300 mm) from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.18 DAMPPROOFING EXTERIOR SITE WALLS

- A. Apply elastomeric coating to CMU core of masonry site landscaping walls prior to finishing with face brick.
- B. Follow manufacturer's instructions for application.
- C. Achieve required dry film thickness by applying multiple coats of product.

3.19 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch (6 mm).
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm/3 m) and 1/2 inch in 20 ft (13 mm/6 m) or more.
- D. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).
- F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch (6 mm).

3.20 CUTTING AND FITTING

- A. Cut and fit for chases, other items, pipes, other items, conduit, other items, sleeves, other items, grounds, other items, and other items. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.21 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
- C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.22 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.

- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.23 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 20 00

SECTION 04 43 16
STONE FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated granite items.
- B. Metal anchors and supports.

1.02 REFERENCE STANDARDS

- A. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2025a.
- B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- C. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- D. ASTM C615/C615M - Standard Specification for Granite Dimension Stone; 2018, with Editorial Revision.
- E. NBGQA (SPEC) - Specifications for Architectural Granite; Version 14-1, 2014.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on each stone type, mortar products, and sealant products.
- C. Shop Drawings: Indicate fabrication details, layout, pertinent dimensions, anchorages, and jointing methods.
- D. Samples: Submit two stone samples 12 by 12 inches in size, indicating color range and texture, markings, surface finish.
- E. Stone fabricator's qualification statement.
- F. Installer's qualification statement.

1.04 QUALITY ASSURANCE

- A. Granite: Perform work in accordance with NBGQA (SPEC).

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store stone on planks, pallets, or timbers, clear of soil and soil splash.
- B. Protect stone from discoloration.

PART 2 PRODUCTS

2.01 FABRICATED ITEMS

- A. Exterior: Granite
 - 1. Size, Shape, and Configuration: As indicated on drawings.

2.02 STONE

- A. Granite; complying with ASTM C615/C615M.
 - 1. Grade: Class I Engineering Grade.
 - 2. Basis of Design:
 - a. Cold Spring Granite Company; Academy Black, Diamond 8 Finish:
www.coldspringusa.com
 - 3. Additional Granite Manufacturers:

- a. Color & Finish shall be equivalent to basis of design manufacturer:
 - 1) Champlain Stone, Ltd: www.champlainstone.com/#sle.
 - 2) North Carolina Granite Corporation: www.ncgranite.com/#sle.
- b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MORTAR

- A. Mortar: ASTM C270, Type N, Proportion specification, using Portland cement of white color.
- B. Color: To be selected from manufacturer full range.

2.04 ANCHORS AND ACCESSORIES

- A. Anchors and Other Components in Contact with Stone: Stainless steel, ASTM A666 Type 304.
 - 1. Sizes and configurations: As required for vertical and horizontal support of stone and applicable loads.
 - 2. Wire ties are not permitted.
- B. Support Components not in Contact with Stone: Stainless steel, ASTM A240/A240M Type 304.
- C. Setting Buttons and Shims: Lead type.

2.05 STONE FABRICATION

- A. Fabricate stone elements in sizes and shapes as necessary and in compliance with requirements indicated on drawings and in specifications.
- B. Finish exposed faces and edges of stones in compliance with indicated requirements for finish under each type and application of stone required and to match approved samples.
- C. Fabricate units for uniform coloration between adjacent units and over the full area of the installation.
- D. Inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that support work and site conditions are ready to receive work of this section.
- B. Verify that built-in items are properly located and sized.

3.02 INSTALLATION

- A. Set stone with a consistent joint width of 3/8 inch (9 mm).

3.03 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting any item not so indicated on drawings.
- B. Do not impair appearance or strength of stone work by cutting.

3.04 CLEANING

- A. Remove excess joint material upon completion of work.
- B. Clean soiled surfaces with cleaning solution.
- C. Use nonmetallic tools in cleaning operations.

END OF SECTION 04 43 16

SECTION 04 72 00
CAST STONE MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural cast stone.
- B. Units required are:
 - 1. Exterior wall units, including date stone.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- B. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.03 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.
- D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2019, with Editorial Revision (2020).
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- G. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
- J. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2021.
- K. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Test results of cast stone components made previously by the manufacturer.
- C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- D. Mortar Color Selection Samples.
- E. Verification Samples: Pieces of actual cast stone components not less than 6 inches (152 mm) square, illustrating range of color and texture to be anticipated in components furnished for the project.
- F. Source Quality Control Test Reports.

- G. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
 - 2. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
 - 3. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Cast Stone:
 - 1. Any current producer member of the Architectural Precast Association.
 - 2. Any current producer member of the Cast Stone Institute.

2.02 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
 - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
 - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
 - 4. Color: Selected by Architect from manufacturer's full range.
 - 5. Remove cement film from exposed surfaces before packaging for shipment.
- B. Shapes: Provide shapes indicated on drawings.
 - 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).

2. Unless otherwise indicated on drawings, provide:
 - a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible.
 - c. Raised fillets at back of sills and at ends to be built in.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.

2.03 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 1. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed bars, galvanized.
 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- I. Mortar: Portland cement-lime, ASTM C270 Type N; do not use masonry cement.
- J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.04 SOURCE QUALITY CONTROL

- A. Test compressive strength and absorption of specimens selected at random from plant production.
 1. Test in accordance with ASTM C642.
 2. Select specimens at rate of 3 per 500 cubic feet (3 per 14 cubic m), with a minimum of 3 per production week.
 3. Submit reports of tests by independent testing agency, showing compliance with requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.
- C. Mechanically anchor cast stone units indicated; set remainder in mortar.

D. Setting:

1. Drench cast stone components with clear, running water immediately before installation.
2. Set units in a full bed of mortar unless otherwise indicated.
3. Fill vertical joints with mortar.
4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 TOLERANCES

A. Joints: Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.

1. Rake mortar joints 3/4 inch (19 mm) for pointing.
2. Remove excess mortar from face of stone before pointing joints.
3. Point joints with mortar in layers 3/8 inch (9.5 mm) thick and tool to a slight concave profile.
4. Leave the following joints open for sealant:
 - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
 - b. Joints in projecting units.
 - c. Joints between rigidly anchored units, including soffits, panels, and column covers.
 - d. Joints below lugged sills and stair treads.
 - e. Joints below ledge and relieving angles.
 - f. Joints labeled "expansion joint".

B. Installation Tolerances:

1. Variation from Plumb: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
2. Variation from Level: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
3. Variation in Joint Width: Not more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch (1.5 mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet (6 m).

1. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
2. Repair methods and results subject to Architect 's approval.

3.05 CLEANING

A. Clean completed exposed cast stone after mortar is thoroughly set and cured.

1. Wet surfaces with water before applying cleaner.
2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
3. Remove cleaner promptly by rinsing thoroughly with clear water.
4. Do not use acidic cleaners.

3.06 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION 04 72 00

SECTION 05 12 00
STRUCTURAL STEEL

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 the following:

1. Structural steel.
2. Grout.

- B. Related Sections include the following:

1. Division 1 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 5 Section "Steel Deck" for field installation of shear connectors.
3. Division 5 Section "Metal Fabrications" for steel lintels or shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other metal items not defined as structural steel.
4. Division 9 painting Sections for surface preparation and priming requirements.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4

- B. Construction: Type 2, simple framing.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
- C. Welding certificates.
- D. Qualification Data: For Installer, fabricator, professional engineer, testing agency.
- E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
 - 1. Structural steel including chemical and physical properties.
 - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 3. Direct-tension indicators.
 - 4. Tension-control, high-strength bolt-nut-washer assemblies.
 - 5. Shear stud connectors.
 - 6. Shop primers.
 - 7. Nonshrink grout.
- F. Source quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD. If the fabricator does not have the AISC certification they can still bid the project but they are responsible to have a third party inspector inspect the fabrication process to ensure they are meeting AISC guidelines.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- E. Comply with applicable provisions of the following specifications and documents:

1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
5. AISC's "Specification for Allowable Stress Design of Single-Angle Members"
6. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

F. Mockups: Build mockups of architecturally exposed structural steel to set quality standards for fabrication and installation.

1. Coordinate finish painting requirements with Division 9 painting Sections.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Corrosion-Resisting Structural Steel: ASTM A 588/A 588M, Grade 50 (345).

- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- F. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847, structural tubing.
- G. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 - 1. Weight Class: Standard, Extra strong, or Double-extra strong, as indicated.
 - 2. Finish: Black, except where indicated to be galvanized.
- H. Medium-Strength Steel Castings: ASTM A 27/A 27M, Grade 65-35 (Grade 450-240), carbon steel.
- I. High-Strength Steel Castings: ASTM A 148/A 148M, Grade 80-50 (Grade 550-345), carbon or alloy steel.
- J. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
 - 1. Finish: Plain.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8,) compressible-washer type.
 - a. Finish: Plain
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 36
 - 1. Configuration: Straight or Hooked, as indicated.
 - 2. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
 - 5. Finish: Plain
- D. Headed Anchor Rods: ASTM F 1554, Grade 36 straight.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
 - 4. Finish: Plain
- E. Threaded Rods: ASTM A 36/A 36M
 - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.

2. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
3. Finish: Plain

F. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.

G. Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.

2.3 PRIMER

- A. Primer: SSPC-Paint 25, Type I, iron oxide, zinc oxide, raw linseed oil, and alkyd.
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.
- C. Galvanizing Repair Paint: ASTM A 780.

2.4 GROUT

- A. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design"
 1. Camber structural-steel members where indicated.
 2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
 3. Mark and match-mark materials for field assembly.
 4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."

- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- G. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches (250 mm) o.c., unless otherwise indicated.
- H. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 - 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials.

5. Galvanized surfaces.

- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.
 - 1. Fill vent holes and grind smooth after galvanizing.
 - 2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.

2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:
1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
- B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of base plate.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.

4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1].
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

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

4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
 1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
 1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.
 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 9 painting Sections.

END OF SECTION

SECTION 05 21 00
STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. K-series steel joists.
 - 2. KCS-type K-series steel joists.
 - 3. LH-series steel joists.
 - 4. Long-span steel joists.
 - 5. Joist accessories.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for installing bearing plates in concrete.
 - 2. Division 04 Section "Unit Masonry" for installing bearing plates in unit masonry.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

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

1.5 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Show layout, designation, number, type, location, and 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.
- C. Welding certificates.
- D. Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.
- E. Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.
- F. Qualification Data: For manufacturer.
- G. Field quality-control test and inspection reports.
- H. Research/Evaluation Reports: For joists.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 SEQUENCING

- A. Deliver steel bearing plates to be built into masonry construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.
- B. Steel Bearing Plates: ASTM A 36/A 36M.
- C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
 - 1. Finish: Plain, uncoated.
- D. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
 - 1. Finish: Plain.
- E. Welding Electrodes: Comply with AWS standards.
- F. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20, ASTM A 780.

2.2 PRIMERS

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

2.3 K-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: K-series steel joists and KCS-type K-series steel joists.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
- C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- D. Provide holes in chord members for connecting and securing other construction to joists.
- E. Top-Chord Extensions: Extend top chords of joists a maximum of 1'-6" with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications" and meeting Total Allowable Load of 550 lb/ft and Allowable Live Load of 450 lb/ft.

- F. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications" and meeting Total Allowable Load of 550 lb/ft and Allowable Live Load of 450 lb/ft.
- G. Camber joists according to SJI's "Specifications." or as indicated.
- H. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.4 LONG-SPAN STEEL JOISTS

- A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as follows or as indicated:
 - 1. Joist Type: LH-series steel joists and DLH-series steel joists.
 - 2. End Arrangement: Underslung.
 - 3. Top-Chord Arrangement: Parallel or pitched if indicated.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C. Provide holes in chord members for connecting and securing other construction to joists.
- D. Camber long-span steel joists according to SJI's "Specifications."
- E. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.5 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability. Provide additional bridging as indicated on structural drawings.
- B. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
- C. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface, unless otherwise indicated.
- D. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.6 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.
- C. Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil (0.025 mm) thick.
- D. Shop priming of joists and joist accessories is specified in Division 09 painting Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

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

- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.
- B. Field welds will be visually inspected according to AWS D1.1/D1.1M.
- C. In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable:
 - 1. Radiographic Testing: ASTM E 94.
 - 2. Magnetic Particle Inspection: ASTM E 709.
 - 3. Ultrasonic Testing: ASTM E 164.
 - 4. Liquid Penetrant Inspection: ASTM E 165.
- D. Bolted connections will be visually inspected.
- E. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- F. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- G. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.
 - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 31 00
STEEL DECK

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. This Section includes the following:
 - 1. Roof deck.
 - 2. Plywood roof sheathing at Dugouts.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
 - 2. Division 05 Section "Structural Steel" for shop- and field-welded shear connectors.
 - 3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
 - 4. Division 09 painting Sections for repair painting of primed deck.
 - 5. Division 16 Section "Underfloor Raceways" for preset inserts, activation kits, after set inserts, service fittings, header ducts, and trench header ducts used with cellular floor-deck systems.

1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.

- G. Research/Evaluation Reports: For steel deck.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- E. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.
- F. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 COORDINATION

- A. Coordinate fastener types with roof deck type and thickness.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard
 - 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 zinc coating.
 - 3. Deck Profile: As indicated.
 - 4. Profile Depth: As indicated.
 - 5. Design Uncoated-Steel Thickness: As indicated.
 - 6. Span Condition: Triple span or more.
 - 7. Side Laps: Overlapped.

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 12 (4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile As indicated.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch (1.52 mm) thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.
- J. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and sloped recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.
- K. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.
- L. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

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

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
 - 1. Weld Diameter: 5/8 inch (16 mm) nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 18 inches (450 mm) apart, maximum or as indicated.
 - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches (910 mm)], and as follows:
 - 1. Mechanically fasten with self-drilling, No. 12 (4.8-mm-) diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
 - 1. End Joints: Lapped 2 inches (51 mm) minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches (305 mm) apart with at least one weld or fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in Division 07

3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: 5/8 inch (16 mm) nominal.
 - 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.
 - 3. Weld Spacing: Space and locate welds as indicated.
 - 4. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (910 mm), and as follows:
 - 1. Mechanically fasten with self-drilling, No. 12 (4.8-mm-) diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm)with end joints as follows:
 - 1. End Joints: Lapped

- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Install piercing hanger tabs at 14 inches (355 mm) apart in both directions, within 9 inches (228 mm) of walls at ends, and not more than 12 inches (305 mm) from walls at sides, unless otherwise indicated.

3.5 FIELD QUALITY CONTROL

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

3.6 REPAIRS AND PROTECTION

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

END OF SECTION

SECTION 05 40 00.00
COLD-FORMED 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. This Section includes the following:

1. Load-bearing wall framing.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing where indicated on structural drawings
4. Floor joist framing.
5. Roof rafter framing.
6. Ceiling joist framing.
7. Soffit framing.

- B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.3 PERFORMANCE REQUIREMENTS

1.4 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Provide standard **plans/sections/details** and product data for lightgauge components and all lightgauge accessories (clip angles, bridging, slide clips, etc.) for review by Engineer-of-Record.
- C. Welding certificates.
- D. Qualification Data: For testing agency.

- E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- F. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
 - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
 - 2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- F. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
 1. AllSteel Products, Inc.
 2. Craco Metals Manufacturing, LLC.
 3. Dale/Incor.
 4. Dietrich Metal Framing; a Worthington Industries Company.
 5. MarinoWare; a division of Ware Industries.
 6. United Metal Products, Inc.

2.2 MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 1. Grade: As Indicated & designed by CFMF engineer.
 2. Coating: G60 (Z180).
- C. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 1. Grade: 50 (340), Class 1 or 2.
 2. Coating: G60 (Z275).

2.3 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: As indicated
 2. Flange Width: As Indicated
 3. Section Properties: As Indicated

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated
 - 2. Flange Width: As Indicated
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated
 - 2. Flange Width: As Indicated
 - 3. Section Properties: As Indicated

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated
 - 2. Section Properties: As Indicated
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated
 - 2. Flange Width: As Indicated
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated
 - 2. Flange Width: As Indicated
- D. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dietrich Metal Framing; a Worthington Industries Company.
 - b. MarinoWare, a division of Ware Industries.
 - c. SCAFCO Corporation
 - d. The Steel Network, Inc.
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
 - a. Minimum Base-Metal Thickness: 16 gauge
 - b. Flange Width: As Indicated.
 2. Inner Track: Of web depth indicated, and as follows:
 - a. Minimum Base-Metal Thickness: 16 gauge
 - b. Flange Width: As Indicated
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.5 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated
 2. Section Properties: As Indicated
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated
 2. Flange Width: As Indicated
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated
 2. Flange Width: As Indicated
- D. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dietrich Metal Framing; a Worthington Industries Company.
 - b. MarinoWare, a division of Ware Industries.
 - c. SCAFCO Corporation
 - d. The Steel Network, Inc.

- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
 - 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
 - a. Minimum Base-Metal Thickness: 16 gauge
 - b. Flange Width: As Indicated.
 - 2. Inner Track: Of web depth indicated, and as follows:
 - a. Minimum Base-Metal Thickness: 16 gauge
 - b. Flange Width: As Indicated
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.6 FLOOR JOIST FRAMING

- A. Steel Joists: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated
 - 2. Flange Width: As Indicated
 - 3. Section Properties: As Indicated
- B. Steel Joist Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated
 - 2. Flange Width: As Indicated

2.7 ROOF-RAFTER FRAMING

- A. Steel Rafters: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated
 - 2. Flange Width: As Indicated
 - 3. Section Properties: As Indicated

2.8 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 18 gauge, unless indicated otherwise

2. Flange Width: 1-5/8" inches, unless indicated otherwise
3. Section Properties: As Indicated

2.9 SOFFIT FRAMING

- A. Exterior Soffit Framing: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 16 gauge, unless indicated otherwise
 2. Flange Width: 1-5/8" inches, unless indicated otherwise
 3. Section Properties: As Indicated

2.10 FRAMING ACCESSORIES

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

2.11 ANCHORS, CLIPS, AND FASTENERS

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

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.12 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.13 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.

2. Cut framing members by sawing or shearing; do not torch cut.

3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
1. For shop-fabricated materials: provide detailed shop drawings including layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 2. Field verify all existing conditions prior to fabrication to account for any potential construction tolerances of other trades.

- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 INSTALLATION OF LOAD-BEARING WALL FRAMING

- A. Install continuous tracks sized to match studs, unless noted otherwise. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch between the end of wall-framing member and the web of track.
 - 1. Fasten both flanges of studs to top and bottom tracks as indicated.
 - a. Do not fasten studs to deflection track, such as in infill wall framing.
 - 2. Space studs as follows:
 - a. Stud Spacing: As Indicated by CFMF engineer with maximum 16" o/c.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
 - 2. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

- a. Install solid blocking at centers indicated.
 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- J. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs, unless noted otherwise. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch between the end of wall-framing member and the web of track.
1. Fasten both flanges of studs to top and bottom tracks as indicated.
 - a. Do not fasten studs to deflection track, such as in infill wall framing.
 2. Space studs as follows:
 - a. Stud Spacing: As Indicated by CFMF engineer with maximum 16" o/c.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
1. Install double deep-leg deflection tracks and anchor outer track to building structure.
 2. Connect vertical deflection clips to bypassing studs and anchor to building structure.
 3. Connect drift clips to cold formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - a. Install solid blocking at centers indicated.
 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.6 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
- a. Stud Spacing: As Indicated by CFMF engineer with maximum 16” o/c.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to studs and anchor to building structure.
 4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
1. Install solid blocking at centers indicated.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.7 INSTALLATION OF JOIST FRAMING

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
 - 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
 - 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections.
- C. Space joists not more than 2 inches from abutting walls, and as follows:
 - 1. Joist Spacing: As indicated.
- D. Frame openings with built-up joist headers, consisting of joist and joist track or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement.
 - 1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
 - 1. Joist-Track Solid Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
 - 2. Combination Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.8 INSTALLATION TOLERANCES.

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.9 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

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

3.11 REPAIRS AND PROTECTION

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

END OF SECTION

**SECTION 054400
COLD-FORMED METAL TRUSSES**

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 cold-formed steel framing in the form of the following:
 - 1. Cold-formed steel trusses for roofs.
 - 2. Cold-formed steel trusses for floors.
- B. Related Requirements:
 - 1. Section 052100 "Steel Joist Framing" for trusslike, steel floor or roof joists and joist girders.
 - 2. Section 054000 "Cold-Formed Metal Framing" for cold-formed steel studs, joists, and rafters.

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. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 3. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 4. Indicate sizes, stress grades, and species of lumber.
 - 5. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.

6. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
7. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
8. Show splice details and bearing details.

- C. Delegated-Design Submittal: For cold-formed steel trusses 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 testing agency.
- B. Welding certificates.
- C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
1. Steel sheet.
 2. Expansion anchors.
 3. Power-actuated anchors.
 4. Mechanical fasteners.
 5. Miscellaneous structural clips and accessories.
- D. Evaluation Reports: For post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
- E. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. MarinoWARE

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel trusses.
- B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.
1. Design Loads: As indicated on Drawings.
 2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
 - a. Floor Trusses: Vertical deflection of 1/480 for live loads and 1/360 for total loads of the span.
 - b. Roof Trusses: Vertical deflection of 1/360 of the span.
 - c. Scissor Roof Trusses: Horizontal deflection of 1-1/4 inches (32 mm) at reactions.
 3. Design trusses to provide for movement of truss members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
- C. Cold-Formed Steel Truss Standards: Unless more stringent requirements are indicated, trusses shall comply with the following:
1. Floor and Roof Systems: AISI S210.
 2. Lateral Design: AISI S213.
 3. Roof Trusses: AISI S214.
- D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL TRUSS MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G90.

2.4 ROOF TRUSSES

- A. Roof Truss Members: Manufacturer's standard C-shaped steel sections.
1. Connecting Flange Width: 1-5/8 inches (41 mm), minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
 2. Minimum Base-Metal Thickness: 0.0966 inch (2.45 mm).
 3. Section Properties: Refer to structural drawings

2.5 TRUSS ACCESSORIES

- A. Fabricate steel-truss accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for truss members.
- B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 55, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C mechanical deposition according to ASTM B 695, Class 50.
- C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES as appropriate for the substrate.
1. Uses: Securing cold-formed steel trusses to structure.
 2. Type: Torque-controlled expansion anchor.
 3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

- D. Power-Actuated Fasteners: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780/A 780M, MIL-P-21035B or SSPC-Paint 20.
- B. Shims: Load-bearing, high-density multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as truss members supported by shims.

2.8 FABRICATION

- A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate trusses using jigs or templates.
 - 2. Cut truss members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual truss members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel truss to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting trusses and framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed steel trusses without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

- A. Install bridge and brace cold-formed steel trusses according to AISI S200, AISI S202, AISI S214, and manufacturer's written instructions unless more stringent requirements are indicated.
 - 1. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure.
 - 2. Anchor trusses securely at all bearing points.
 - 3. Install continuous bridging and permanently brace trusses as indicated on Drawings and as indicated on Shop Drawings and designed according to CFSEI's Technical Note 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses."
- B. Install cold-formed steel trusses and accessories true to line and location, and with connections securely fastened.
 - 1. Erect trusses with plane of truss webs plumb and parallel to each other. Align and accurately position trusses at required spacings.
 - 2. Erect trusses without damaging truss members or connections.
 - 3. Fasten cold-formed steel trusses by welding or mechanical fasteners.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

- C. Install temporary bracing and supports to secure trusses and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to trusses are secured.
- D. Truss Spacing: As indicated on Drawings.
- E. Do not alter, cut, or remove truss members or connections of trusses.

3.4 ERECTION TOLERANCES

- A. Install cold-formed steel trusses level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - 1. Cold-Formed Steel Trusses Spanning 60 ft. (18,288 mm) or Longer: Verify temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed according to the approved truss submittal package.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Cold-formed metal trusses will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.6 REPAIRS AND PROTECTION

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

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 01, Section 017419 – Construction Waste Management.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel framing and supports for countertops.
 - 2. Steel framing and supports for mechanical and electrical equipment.
 - 3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 4. Loose bearing and leveling plates for applications where they are not specified in other Sections.
 - 5. Metal Ladders
 - 6. Metal Downspout Boots
 - 7. Metal Bollards and exterior corner guards
- B. Products furnished, but not installed, under this Section:
 - 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete" and "Architectural Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
 - 2. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
 - 3. Division 05 Section "Structural Steel Framing."
 - 4. Division 05 Section "Pipe and Tube Railings."

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Grout.
 - 3. Ladders
 - 4. Bollards
 - 5. Exterior corner guards
 - 6. Downspout Boots
- B. Shop Drawings: Show fabrication and installation details for metal fabrications, including (but not limited to) ladders, bollards, steel framing and supports, etc.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Samples for Verification: For metal bollards, exterior corner guards metal ladders, and downspout boots, metal mesh.
- D. Delegated-Design Submittal: For installed products (including metal ladders) indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For qualified professional engineer.
- F. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
- G. Welding certificates.
- H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- C. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B, with G90 (Z275) coating; 0.108-inch (2.8-mm) nominal thickness.

F. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 NONFERROUS METALS

A. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

E. Bronze Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).

F. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).

G. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

H. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.

I. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.
4. Provide bronze fasteners for fastening bronze.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).

- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- G. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- J. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
- K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- L. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- M. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594.
- N. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- I. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlapping.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
 - 3. Provide bearing plates welded to beams where indicated.
 - 4. Drill or punch girders and plates for field-bolted connections where indicated.
 - 5. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches (600 mm) o.c.
- C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
 - 1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
 - 2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6.4-mm) top plates.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.
- F. Basis of Design: Countertop Bracket

1. Provide the following product, or approved equal:
 - a. Centerline Steel LLC – Forward L Bracket
 - b. Mount as noted in drawings.
2. Properties:
 - a. A36 Steel
 - b. Cross Section: Min. 1/2” thick x 2-1/2” wide
 - c. Depth: As noted on drawings
 - d. Finish / Color: TBD

2.8 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.
- C. Prime plates with zinc-rich primer.

2.9 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches (200 mm) unless otherwise indicated.
- C. Galvanize loose steel lintels located in exterior walls.
- D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.10 STEEL WELD PLATES AND ANGLES

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

2.11 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with universal shop primer unless zinc-rich primer is indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.13 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
- C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

2.14 METAL ROOF AND EXTERIOR LADDERS

- A. Exterior Fixed Roof Ladders: Tubular Rail Low Parapet Access Ladder with Platform and Return.
 - 1. Basis of Design Product: 503A O'KEEFFE'S low parapet ladder with platform only or approved equal
 - 2. Walk-Through Rail and Roof Rail Extension: Not less than 3 feet 6 inches (1067 mm) above the landing and shall be fitted with deeply serrated, square, tubular grab rails.
 - 3. Landing Platform: 1-1/2 inches (38 mm) or greater diameter, tubular aluminum guardrails and decks of serrated aluminum treads.
 - 4. Provide personal fall arrest system or a ladder safety system.

- B. Ladder Materials
 - 1. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.
 - 2. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.
- C. Ladder finish: Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural Class I, clear coating 0.018 mm or thicker.
- D. Rungs: Not less than 1-1/4 inches (32 mm) in section and 18-3/8 inches (467mm) long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.
 - 1. Rungs shall withstand a 1,500 pound (454 kg) load without deformation or failure.
 - 2. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.
- E. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted aluminum brackets.
- F. Comply with ANSI A14.3
- G. Provide intermediate brackets in order to keep maximum bracket spacing at 10 feet on center. For exterior roof ladders, provide mounting bracket to wall to keep ladder rails above roof.
- H. Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.

2.15 INTERIOR FIXED LADDERS

- A. Steel Ladders:
 - 1. Space side rails 16 inches clear between side rails unless otherwise indicated.
 - 2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
 - 3. Rungs: 3/4-inch-square, steel bars, maximum 12 inches on center.
 - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces. Rungs shall withstand a 1,500 pound (454 kg) load without deformation or failure.
 - 5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout. Manufacturers of products below claim they wear better than granules set in epoxy-resin adhesive.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Harsco Industrial IKG, a division of Harsco Corporation.
 - 2) Ross Technology Corporation.
 - 3) W.S. Molnar Company.
 - 6. Source Limitations: Obtain nonslip surfaces from single source from single manufacturer.

7. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets. Brackets shall hold ladder a minimum of 7 inches from face of supporting wall.
8. Galvanize ladders, including brackets.

2.16 DOWNSPOUT BOOTS

- A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots, integral cleanout, cleanout cover, and tamper proof fasteners.
 1. Configuration: Offset.
 2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
 3. Finish: Manufacturer's standard factory applied powder coat finish.
 4. Color: To be selected by Architect from manufacturer's standard range.
 5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, integral neoprene gaskets, and rubber coupling.
 6. Available Manufacturers offering Basis of Design products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Downspoutboots.com, a division of J. R. Hoe & Sons; O Series
 - b. Neenah Foundry, a division of Neenah Enterprises, Inc; Model R-4929-O6C

2.17 METAL BOLLARDS

- A. Manufacturer (or Approved Equal):
 1. Reliance Foundry Co. Ltd.
 2. Phone: 604-547-0460 or 1-877-789-3245
 3. Fax: 604-590-8875
 4. Website: <http://www.reliance-foundry.com/bollard>
 5. Email: info@reliance-foundry.com
- B. Bollard:
 1. Model: Reliance Foundry; **R-8902**.
 2. Height: 36 inches
 3. Diameter: 4-3/8 inches body; 7-1/2 inches base
 4. Design: Cylindrical with rounded top.
 5. Material: Stainless steel, ASTM A312, Grade TP 316.
 6. Installation Type:
 - a. SSB1: Fixed Embedded Concrete Anchor.

2.18 EXTERIOR CORNER GUARDS

- A. Manufacturer: JW Metal Products co..
 1. Phone: 877-484-0088
 2. Fax: 866-430-3134
 3. Website: <https://stainlesssupply.com/corner-guards/docs/corner-guards.php?sc1=36>
 4. Substitutions: Comply with provisions of Section 01 25 00 "Substitution Procedures"
- B. Corner Guard
 1. Height: 30 inches

2. Size: 2 inches x 2 inches
3. Thickness: 14 Gauge
4. Angle: 90 Degree
5. Material: Stainless steel, 316L, #4.
6. Installation Type:
 - a. Mounting Holes

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

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

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 05 51 33
METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prefabricated ladders.

1.02 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Ladders; Current Edition.
- B. 29 CFR 1926.1053 - Ladders; Current Edition.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- D. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- E. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- F. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- G. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).
- H. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2018, with Editorial Revision.
- I. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings; 2018, with Editorial Revision.
- J. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- K. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.
- L. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.
- M. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).
- N. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B211/B211M, 6063 alloy, T6 temper.

- B. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.
- D. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.
- E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
- F. Aluminum-Alloy Die Castings: ASTM B85/B85M .
- G. Bolts, Nuts, and Washers: Stainless steel.
- H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.02 PREFABRICATED LADDERS

- A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
 - 1. Components: Manufacturer's standard rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
 - 2. Materials: Aluminum; ASTM B211/B211M 6063 alloy, T52 temper.
 - 3. Finish: Mill finish aluminum.
 - 4. Manufacturers:
 - a. Industrial Ladder & Scaffolding, Inc.: www.anyladder.com/#sle.
 - b. Basis of Design: O'Keeffe's Inc; Model 500: www.okeeffes.com/#sle.
 - c. Precision Ladders, LLC; Fixed Aluminium Wall Ladder: www.precisionladders.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: Class I natural anodized.
- B. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION 05 51 33

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Sheathing.
- B. Roofing nailers.
- C. Preservative treated wood materials.
- D. Fire retardant treated wood materials.
- E. Miscellaneous framing and sheathing.
- F. Communications and electrical room mounting boards.
- G. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 07 25 00 - Weather Barriers: Air barrier over sheathing.
- C. Section 09 21 16 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing 2010.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- D. AWPA U1 - Use Category System: User Specification for Treated Wood 2012.
- E. PS 1 - Structural Plywood 2009.
- F. PS 2 - Performance Standard for Wood-Based Structural-Use Panels 2010.
- G. PS 20 - American Softwood Lumber Standard 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and rough carpentry products.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: Kiln-dry or MC15.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- B. Other Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Other Locations: PS 1, C-D Plugged or better.
 - 3. Plywood Roof Deck:
 - a. Exterior, pressure-treated plywood, Exposure 1.
 - b. 5/8-inch thick if rafter 16-inch on-center
 - c. 3/4-inch thick plywood for 24-inch on-center or heavy-load applications, APA rated 48/24

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 - 3. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B. Water-Resistive Barrier: As specified in Section 07 25 00.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Fire Retardant Treatment:
1. Manufacturers:
 - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
 - b. Hoover Treated Wood Products, Inc: www.frtw.com.
 - c. Koppers, Inc: www.koppers.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat plywood panels that are a substrate for GFRC trim.
 - c. Treat other rough carpentry items as indicated.
 - d. Do not use treated wood in direct contact with the ground.
 3. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat interior plywood sheathing for story steps and built-in benches.
 - c. Treat rough carpentry items as indicated .
 - d. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
1. Manufacturers:
 - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
 - b. Koppers Performance Chemicals, Inc: www.koppersperformancechemicals.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with flashing or waterproofing.
 - d. Treat lumber in contact with masonry or concrete.
 - e. Treat lumber less than 18 inches above grade.
 - f. Treat lumber in other locations as indicated.
 - g. Treat lumber used for wood blocking within cavity wall construction..
 3. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with flashing or waterproofing.
 - c. Treat plywood in contact with masonry or concrete.
 - d. Treat plywood less than 18 inches above grade.

- e. Treat plywood in other locations as indicated.
- f. Treat plywood used for wood blocking within cavity wall construction..
- 4. Plywood Roof Sheathing:
 - a. Thickness: See Drawings
 - b. APA rated.
 - c. Fire rated. Flame spread index: 25 or less, as determined by ASTM E84, UL 723, or NFPA 255. Smoke developed index: 100 or less when tested according to ASTM E84, UL 723, or NFPA 255.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific non-structural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Chalkboards and marker boards.
 - 8. Wall paneling and trim.
 - 9. Joints of rigid wall coverings that occur between studs.
 - 10. Smartboard and monitor mounts.

3.03 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

- B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using screws.
 - 1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.
- B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
 - 4. Size: 48 by 96 inches, installed horizontally at ceiling height.

3.05 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.06 CLEANING

- A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 07 05 53 - FIRE AND SMOKE ASSEMBLY IDENTIFICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.02 RELATED REQUIREMENTS

- A. Section 09 90 00 - Paints and Coatings: Paint finish.

1.03 REFERENCE STANDARDS

- A. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.
- C. Schedule: Completely define scope of proposed marking, and indicate location of affected walls and partitions, and number of markings.

1.05 FIELD CONDITIONS

- A. Do not install painted markings when ambient temperature is lower than recommended by coating manufacturer.

PART 2 PRODUCTS

3.01 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

- A. Regulatory Requirements: Comply with "Marking and Identification" requirements of "Fire-Resistance Ratings and Fire Tests" chapter of ICC (IBC).

PART 3 EXECUTION

5.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

5.02 PREPARATION

- A. See Section 09 90 00 for substrate preparation for painted markings.

5.03 INSTALLATION

- A. Locate markings as required by ICC (IBC).
- B. Install neatly, with horizontal edges level.
- C. Protect from damage until Date of Substantial Completion; repair or replace damaged markings.

END OF SECTION

SECTION 07 05 53
FIRE AND SMOKE ASSEMBLY IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.02 RELATED REQUIREMENTS

- A. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.
- C. Schedule: Completely define scope of proposed marking, and indicate location of affected walls and partitions, and number of markings.

1.05 FIELD CONDITIONS

- A. Do not install painted markings when ambient temperature is lower than recommended by coating manufacturer.

PART 2 PRODUCTS

2.01 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

- A. Regulatory Requirements: Comply with "Marking and Identification" requirements of "Fire-Resistance Ratings and Fire Tests" chapter of ICC (IBC).
- B. Applied Fire and Smoke Assembly Identification: Identification markings applied to partition with paint and a code compliant stencil. See Section 09 91 23 for products.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 PREPARATION

- A. See Section 09 91 23 for substrate preparation for painted markings.

3.03 INSTALLATION

- A. Locate markings as required by ICC (IBC).
- B. Install applied markings in accordance with Section 09 91 23.
- C. Install neatly, with horizontal edges level.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged markings.

END OF SECTION 07 05 53

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SECTION 07 13 00
SHEET WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Self-adhered rubberized asphalt sheet membrane.
- B. Self-adhered HDPE sheet membrane.

1.02 REFERENCE STANDARDS

- A. ASTM C836/C836M - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course; 2012.
- B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-- Tension; 2016 (Reapproved 2021).
- C. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 2022.
- D. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2020).
- E. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.
- F. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact; 2020.
- G. ASTM D751 - Standard Test Methods for Coated Fabrics; 2019.
- H. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2012.
- I. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds; 1998 (Reapproved 2017).
- J. ASTM D1876 - Standard Test Method for Peel Resistance of Adhesives (T-Peel Test); 2008.
- K. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- L. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers; 2009.
- M. ASTM D5295/D5295M - Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems; 2014.
- N. ASTM D5385/D5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes; 1993 (Reapproved 2014).
- O. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- P. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2019).
- Q. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for membrane.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 10 years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least 5 years of documented experience.

1.05 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application and until liquid or mastic accessories have cured.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Contractor to correct defective Work within period of five years after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.
- C. Provide 10 year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.01 SHEET WATERPROOFING APPLICATIONS

- A. Self-Adhered Rubberized Asphalt Sheet Membrane:
 - 1. Location: Foundations.
 - 2. Cover with protection board.
- B. Self-Adhered HDPE Sheet Membrane:
 - 1. Location: Elevator Pit, and Automotive Paint Booth Pit.

2.02 SHEET WATERPROOFING MATERIALS

- A. Self-Adhered Rubberized Asphalt Sheet Membrane:
 - 1. Thickness: 63 mil, 0.061 inch (1.6 mm), minimum.
 - 2. Sheet Width: 3.28 feet (1 m), minimum.
 - 3. Tensile Strength:
 - a. Film: 15,000 psi (103.42 MPa), minimum, measured in accordance with ASTM D882 and at grip-separation rate of 2 inches (50 mm) per minute.
 - b. Membrane: 425 psi (2.93 MPa), minimum, measured in accordance with ASTM D412 Method A, using die C and at spindle-separation rate of 2 inches (50 mm) per minute.
 - 4. Elongation at Break: Greater than 200 percent, minimum, measured in accordance with ASTM D412.
 - 5. Water Vapor Permeance: 0.05 perm (2.9 ng/(Pa s sq m)), maximum, measured in accordance with ASTM E96/E96M.
 - 6. Low Temperature Flexibility: Unaffected when tested in accordance with ASTM D1970/D1970M at minus 25 degrees F (minus 32 degrees C), 180 degree bend on 1 inch (25 mm) mandrel.
 - 7. Peel Adhesion to Concrete: 9 lb/inch (1.02 N/m), minimum, when tested in accordance with ASTM D903.

8. Lap Adhesion: 9 lb/inch (1.02 N/m), minimum, measured in accordance with ASTM D4541.
 9. Puncture Resistance: 60 lb (27.2 kg), minimum, in accordance with ASTM E154/E154M.
 10. Water Absorption: 0.1 percent increase in weight, maximum, measured in accordance with ASTM D570, 24 hour immersion.
 11. Hydrostatic Pressure Resistance: Membrane resists leakage for at least one hour from pressure equivalent to 200 feet (61 m) head of water applied in accordance with test method ASTM D5385/D5385M.
 12. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.
- B. Self-Adhered HDPE Sheet Membrane: Recommended by manufacturer for placement below concrete slabs and on outside face of below grade walls before placement of concrete.
1. Sheet Thickness: 32 mil, 0.032 inch (0.8 mm), minimum.
 2. Low Temperature Flexibility: Unaffected when tested in accordance with ASTM D1970/D1970M at minus 20 degrees F (minus 29 degrees C), 180 degree bend on 1 inch (25 mm) mandrel.
 3. Hydrostatic Pressure Resistance: Membrane resists leakage for at least one hour from pressure equivalent to 231 feet (70.4 m) head of water applied in accordance with test method ASTM D5385/D5385M.
 4. Elongation at Break: 500 percent, minimum, measured in accordance with ASTM D412.
 5. Tensile Strength, Film: 3,500 psi (24 MPa), minimum, measured in accordance with ASTM D412.
 6. Adhesion: 150 psi (1.03 MPa), minimum, measured in accordance with ASTM D4541.
 7. Water Vapor Permeance: 0.01 perm (0.6 ng/(Pa s sq m)), maximum, measured in accordance with ASTM E96/E96M.
 8. Lateral Water Migration Resistance: Resists pressure of 231 ft (70 m) head of water, when tested in accordance with ASTM D5385/D5385M.
 9. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.

2.03 ACCESSORIES

- A. Seaming Materials: As recommended by membrane manufacturer.
- B. Membrane Sealant: As recommended by membrane manufacturer.
- C. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.
- D. Protection Board: Provide type capable of preventing damage to waterproofing due to backfilling and construction traffic.
- E. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.
 1. Composition: Dimpled polystyrene, polyethylene, or polypropylene core; polypropylene filter fabric.
- F. Self-Adhered Flashing: Composite membrane with top layer consisting of Ketone Ethylene Ester (KEE) reinforced membrane and backed by bottom layer of synthetic butyl adhesive covered with release paper.
- G. Preformed Flashing Shapes: Injected or vacuum molded one piece shapes used for detailing of inside and outside corners, protrusions, and transitions.
 1. Color: Black.
- H. Flexible Flashings: Type recommended by membrane manufacturer.

- I. Adhesives: As recommended by membrane manufacturer.
- J. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting work.
- B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.
- C. Verify that items penetrating surfaces to receive waterproofing are securely installed.
- D. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.
- E. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protect adjacent surfaces from damage not designated to receive waterproofing.
- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.
- C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.
- D. Fill nonmoving joints and cracks with a filler compatible with waterproofing materials.
- E. Seal moving cracks with sealant and nonrigid filler, using procedures recommended by sealant and waterproofing manufacturers.
- F. Prepare building expansion joints at locations as indicated on drawings.
- G. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.
- H. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate in accordance with ASTM D5295/D5295M.
 - 1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease and oil.
 - 2. Repair surface defects including honeycombs, fins, tie holes, bug holes, sharp offsets, ruttled cracks, ragged corners, deviations in surface plane, spalling and delaminations, as described in reference standard.
 - 3. Remove and replace areas of defective concrete; see Section 03 30 00.
 - 4. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in referenced standard.
 - 5. Test concrete surfaces as described in referenced standards, and verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.03 INSTALLATION - MEMBRANE

- A. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- B. Roll out membrane, and minimize wrinkles and bubbles.
- C. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.
- D. Overlap edges and ends, minimum 3 inches (76 mm), seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.

- E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.
- F. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.
- G. Install building expansion joints at locations as indicated on drawings.
- H. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.
- I. Seal membrane and flashings to adjoining surfaces.
 - 1. Install termination bar along edges.
 - 2. Install counterflashing over exposed edges.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

- A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward; scribe and cut boards around projections, penetrations, and interruptions.
- B. Place protection board directly against drainage panel; butt joints, and scribe and cut boards around projections, penetrations, and interruptions.
- C. Adhere protection board to substrate with compatible adhesive.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

3.06 PROTECTION

- A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION 07 13 00

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SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at cavity wall construction, cavity wall construction, perimeter foundation wall, perimeter foundation wall, underside of floor slabs, underside of floor slabs, exterior wall behind _____ wall finish, and exterior wall behind metal panel wall finish.
- B. Batt insulation in exterior construction.
- C. Acoustical insulation in interior partitions.
- D. Batt insulation for filling fire-rated assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 07 25 00 - Weather Barriers : Separate air barrier materials.
- B. Section 07 21 29 - Sprayed Acoustical Insulation: Sprayed-on, adhered fibrous insulation.
- C. Section 07 26 40 - Spray Polyurethane Foam Insulating Air Barrier : Sprayed thermal insulation and air barrier.
- D. Section 07 53 00 - Elastomeric Membrane Roofing: Insulation specified as part of roofing system.
- E. Section 07 84 00 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.

1.03 DEFINITIONS

- A. Mineral Fiber Material Composition: Insulation referred to as mineral fiber block, board, and blanket insulation is composed of fibers from mineral based substances such as rock, slag, or glass and processed from the molten state into fibrous form.
 - 1. Based on type of insulation substance, the material will be referred to as a mineral fiber when having a rock or slag base, and glass fiber with a glass or silica sand base, also considered a mineral.
 - 2. Insulation blankets are flexible units consisting of felted, bonded, or unbonded fibers formed into rolls or flat cut pieces referred to as batts; rolls are simply longer versions of batts.
 - 3. For additional information about mineral fiber and the various classification types, refer to the following reference standards; ASTM C553, ASTM C612, ASTM C665, and ASTM C726.

1.04 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.
- B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- D. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.

- G. ASTM C726 - Standard Specification for Mineral Wool Roof Insulation Board; 2017.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- I. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015 (Reapproved 2020).
- J. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, product limitations, and other relevant data.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.06 QUALITY ASSURANCE

- A. Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by r-values, they represent the rate of heat flow through a homogenous material exactly 1" thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperature indicated.
- B. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface Burning Characteristics: ASTM E 84.
 - 2. Fire Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.
- C. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction

PART 2 PRODUCTS

2.01 INSULATION TYPES

- A. General
 - 1. The categorizations of thermal barriers by location, form, and application in this Article are general descriptions only. Refer to the Drawings and other Sections for specific requirements.
- B. Type 1: Mineral fiber batt insulation with no vapor retarder.
 - 1. Application: Thermal insulation.
 - 2. Location: Stud cavities of exterior metal-framed walls.
- C. Type 2: (NOT USED)

- D. Type 3: Extruded polystyrene (XPS)
 - 1. Application: Thermal insulation.
 - 2. Location: Perimeter of Foundation, Under Concrete Slabs.
- E. Type 4: (NOT USED)
- F. Type 4A: Mineral fiber board.
 - 1. Application: Thermal insulation.
 - 2. Location: Exterior cavity walls behind finishes other than masonry veneer and as indicated.
- G. Type 5: Mineral fiber batt insulation with no vapor retarder.
 - 1. Application: Acoustical insulation.
 - 2. Location: Stud cavities of sound-rated partitions.
- H. Type 6: Mineral fiber batts.
 - 1. Application: Fire safing insulation.
 - 2. Location:
 - a. In voids and penetrations of fire separations and smoke walls.
 - b. At terminations of rated CMU partitions to deck above.
 - c. At perimeter
 - 3. Form: Batts or blankets.
- I. Type 7: Spray Polyurethane Foam
 - 1. Application: Thermal insulation.
 - 2. Location: Exterior cavity walls behind masonry veneer.
 - 3. See Section 07 26 40 - Spray Polyurethane Foam Insulating Air Barrier.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Type 3: Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Type and Thermal Resistance, R-value (RSI-value): Type VI, 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
 - 4. Board Edges: Square.
 - 5. Type and Water Absorption: Type VI, 0.3 percent by volume, maximum, by total immersion.
 - 6. Products:
 - a. DuPont de Nemours, Inc; Styrofoam Brand Highload 40: building.dupont.com/#sle.
 - b. Dow Chemical Company; Highload 40: www.dow.com.
 - c. Owens Corning Corporation; FOAMULAR Type 400 Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MINERAL FIBER BOARD INSULATION MATERIALS

- A. Type 4A: Mineral Wool Block or Board Thermal Insulation: Complying with ASTM C612, Type IVB.
 - 1. Flame Spread Index: 0 (zero), when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 - 3. Board Size: 16 by 48 inches (405 by 1220 mm).
 - 4. Board Thickness: 2-1/2 inches (64 mm).
 - 5. Thermal Resistance: R-value (RSI-value) of 4.3 (0.76) per inch at 75 degrees F (24 C), minimum, when tested in accordance with ASTM C518.

6. Density: 6.2 pcf (___ kg/cu m), nominal, outer layer; 3.8 pcf, nominal, inner layer;
 7. Water vapor permeance: 27.2 perm per ASTM E 96.
 8. Products:
 - a. ROCKWOOL; CAVITYROCK: www.rockwool.com/#sle.
 - b. Thermafiber, Inc; RainBarrier HD: www.thermafiber.com/#sle.
 9. Substitutions: See Section 01 60 00 - Product Requirements See Section 01 60 00 - Product Requirements.
- B. Type 6: Mineral Wool Block, Board, or Blanket Fire Safing Insulation: Complying with ASTM C612 or ASTM C553.
1. Flame Spread Index: 0 (zero), when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 3. Products:
 - a. Johns Manville; MinWool Safing: www.jm.com/#sle.
 - b. Johns Manville: www.jm.com/#sle.
 - c. ROCKWOOL; CURTAINROCK 40: www.rockwool.com/#sle.
 - d. ROCKWOOL; ROXUL SAFE: www.rockwool.com/#sle.
 - e. Thermafiber, Inc; FireSpan 40: www.thermafiber.com/#sle.
 - f. Thermafiber, Inc; Safing: www.thermafiber.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Type 1: Mineral Wool Blanket Thermal Insulation: Flexible or semi-rigid preformed insulation, complying with ASTM C665.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 3. Thermal Resistance: R-value (RSI-value) of 4.0 per inch (___).
 4. Products:
 - a. Johns Manville; Mineral Wool TempControl Batts: www.jm.com/#sle.
 - b. ROCKWOOL; COMFORTBATT: www.rockwool.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type 5: Mineral Wool Blanket Acoustical Insulation: Flexible or semi-rigid preformed insulation, complying with ASTM C665.
1. Flame Spread Index: 0 (zero), when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 3. Board Size: 16 by 48 inches (405 by 1220 mm).
 4. Thickness: As shown.
 5. Density: 6.2 pcf (99.3 kg/cu m), nominal.
 6. Products:
 - a. Johns Manville: www.jm.com/#sle.
 - b. ROCKWOOL; AFB: www.rockwool.com/#sle.
 - c. Thermafiber, Inc; SAFB: www.thermafiber.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

- A. Tape joints of rigid insulation in accordance with insulation manufacturers' instructions.
- B. Insulation Fasteners: Impaling clip of galvanized steel with washer retainer and clips and clips, to be mechanically fastened to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

- C. Adhesive: Type recommended by insulation manufacturer for application. See Section 07 25 00 for insulation compatible with air barriers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- B. Install boards horizontally on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Install boards horizontally on walls.
 - 1. Install in running bond pattern.
 - 2. Butt edges and ends tightly to adjacent boards and protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.04 BOARD INSTALLATION AT CAVITY WALLS

- A. Secure impale fasteners to substrate at following frequency:
 - 1. Six (6) per insulation board.
- B. Install boards to fit snugly between wall ties.
- C. Install boards horizontally on walls.
 - 1. Butt edges and ends tightly to adjacent boards and protrusions.
 - 2. Place impale fastener locking discs.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.07 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 07 21 00

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS

- A. Section 07 26 00 - Under-Slab Vapor Barrier
- B. Section 07 26 40 - Spray Polyurethane Foam Insulating Air Barrier: Insulation and air barrier in exterior walls.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Flashings installed in conjunction with air barriers.
- D. Section 07 92 00 - Joint Sealants: Sealing building expansion joints.

1.03 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
 - 1. Water Vapor Permeance: For purposes of conversion, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$.
- D. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture-resistant, to the degree specified, intended to be installed to shed water, with sealed seams.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.
- E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- F. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification; keep copies of each contractor accreditation and installer certification on site during and after installation, and present on-site documentation upon request.

1.05 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP);
www.airbarrier.org/#sle:

1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

A. Air Barrier:

1. On outside surface of gypsum sheathing of exterior walls where Spray Polyurethane Foam Insulating Air Barrier is not indicated, use air barrier sheet, self-adhesive type.

2.02 AIR BARRIER MATERIALS (AIR BARRIER, VAPOR PERMEABLE, AND WATER-RESISTIVE)

A. Air Barrier Sheet (Walls): ASTM D1970.

1. Type: Self-adhered vapor permeable, water resistive air barrier consisting of a reinforced, modified polyolefin tri-laminate film surface and patented permeable adhesive technology with split-back poly-release film.
2. Thickness: 23 mil (___ mm), nominal.
3. Water Vapor Permeance: 29 perm (___ ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M.
4. Air Permeance: Pass (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.
5. Manufacturers:
 - a. Henry Company; Blueskin VP 160: www.henry.com/sle..
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 SEALANTS

- A. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.

2.04 ADHESIVES

- A. Mastic Adhesive : Compatible with sheet seal and substrate, thick mastic of uniform knife grade consistency .

2.05 ACCESSORIES

- A. Transition Membrane: Self-adhering, smooth surfaced SBS modified bitumen membrane, nominal 40 mil thickness, width as required, to detail all rough openings, changes in material substrates, and penetrations.
 1. Blueskin SA as manufactured by Henry Company Inc
- B. Sheet Membrane Transition Strip Termination Sealant:
 1. BES 925 Sealant by Henry Company Inc
- C. Primer: Water based liquid primer for concrete, masonry, gypsum sheathing, wood, metal, and painted substrates;
 1. Aquatac as manufactured by Henry Company Inc.
- D. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water and with sealed seams and with sealed joints to adjacent surfaces.
- C. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- D. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- E. Self-Adhered Sheets:
 - 1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
 - 2. Lap sheets shingle-fashion to shed water and seal laps air tight.
 - 3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
 - 4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
 - 5. At wide joints, provide extra flexible membrane allowing joint movement.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
 - 1. Provide testing and inspection required by ABAA QAP.
 - 2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
 - 3. Cooperate with ABAA testing agency.
 - 4. Allow access to air barrier work areas and staging.
 - 5. Do not cover air barrier work until tested, inspected, and accepted.
- C. Do not cover installed weather barriers until required inspections have been completed.
- D. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 07 25 00

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SECTION 07 26 40

SPRAY POLYURETHANE FOAM INSULATING AIR BARRIER

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes the following:
 - 1. Materials and installation to bridge and seal the following air leakage pathways and gaps:
 - a. Connections of the walls to the roof air barrier.
 - b. Connections of the walls to the foundations.
 - c. Openings and penetrations of window frames.
 - d. Barrier envelope systems.
 - e. Door frames.
 - f. Piping, conduit, duct and similar penetrations
 - g. Masonry ties, screws, bolts and similar penetrations.
 - h. All other air leakage pathways in the building envelope.

1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- A. Sheet metal flashings to be built into masonry are furnished under Section 07 62 00.

1.03 RELATED SECTIONS

- A. Section 04 20 00 - Unit Masonry:
 - 1. Masonry backup walls
 - 2. Masonry veneer cavity walls.
- B. Section 07 21 00 - Thermal Insulation : Other building Insulation.
- C. Section 07 92 00 - Joint Sealants : Joint sealant materials and installation.
- D. Section 08 11 13- Hollow Metal Door frames.
- E. Section 08 43 13 Aluminum Storefronts and Entrances
- F. Section 08 44 13 - Glazed Aluminum Curtain Walls

1.04 PERFORMANCE REQUIREMENTS

- A. Provide air/vapor barrier system constructed to perform as follows:
 - 1. A continuous air/vapor barrier system.
 - 2. Building thermal insulation.
- B. System shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air seal materials at such locations, changes in substrate and perimeter conditions.
- C. Maximum Permissible Air Leakage Rates cfm/sf @ 0.3" w.g. (1/s.m2 @ 75 Pa)

1.05 SUBMITTALS

- A. Provide submittals in accordance with Section 013000.
- B. Submit shop drawings showing locations and extent of air/vapor barrier and details of all typical conditions, intersections with other envelope systems and materials, membrane flashings and counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated and how miscellaneous penetrations such as conduits, pipes electric boxes and the like are sealed.
- C. Submit manufacturer's product data sheets for each type of material, including manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other

limitations of installation conditions, technical data, and tested physical and performance properties.

- D. Submit manufacturer's installation instructions.
- E. Provide evidence of testing by an accredited laboratory confirming material has been tested and conforms to the requirements of ASTM E2178, Standard for Air Barrier Materials.
- F. Certification by air/vapor barrier manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- G. Certification of compatibility by air/vapor barrier manufacturer, listing all materials on the project that it connects to or that come in contact with it.
- H. Submit two samples, 12 by 12 inch (300 by 300 mm) minimum size, of each air/vapor barrier material required for Project.
- I. Submit test results of air permeability testing of primary air barrier material (ASTM E 2178-01).
- J. Provide evidence of testing by an accredited laboratory confirming material has been tested and conforms to the requirements of ASTM E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies: Pass.
- K. Provide evidence of testing by an accredited laboratory confirming material has been tested and conforms to the requirements of NFPA 285: Pass.
- L. Quality Assurance Program: Submit evidence of current accreditation and certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program. Submit accreditation number of manufacturer and certification number of installers at time of submittal.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Each worker who is installing air barriers must be either a Certified Applicator or an installer who is registered with ABAA
 - 2. Each Lead Certified Applicator can supervise a maximum of five registered installers. The Certified Applicator shall be thoroughly trained and experienced in the installation of air barriers of the types being applied. Lead Certified Applicators shall perform or directly supervise all air/vapor barrier work on the project.
 - 3. Installers shall also be certified by ABAA/NECA (National Energy Conservation Association) and PSDI (Professional Skills Development Institute for energy conservation) and SPFA (Spray Polyurethane Foam Alliance as foam mechanics). Installers shall have their photo-identification certification cards in their possession and available on the project site, for inspection upon request.
 - 4. Provide products that comply with all state and local regulations controlling use of volatile organic compounds (VOCs).
 - 5. Preconstruction Meeting: Convene one week prior to commencing Work of this section, in accordance with Section 01 20 00 - Project Meetings.
 - 6. Field-Constructed Mock-Ups: Prior to installation of air/vapor barrier, apply air/vapor barrier as follows to verify details under shop drawing submittals and to demonstrate tie-ins with adjoining construction, and other termination conditions, as well as qualities of materials and execution:
 - a. Apply air/vapor barrier in field-constructed mock-ups of assemblies specified in Section 04 20 00.

7. Cooperate and coordinate with the Owner's inspection and testing agency if required. Do not cover any installed air and vapor barrier unless it has been inspected, tested and approved per requirements.
8. Protect people and materials from over-spray and contact with chemicals and gases.

1.07 FIELD QUALITY ASSURANCE

- A. Implement the ABAA Quality Assurance Program requirements. Cooperate with ABAA inspectors and independent testing and inspection agencies engaged by the Owner. Do not cover air barrier until it has been inspected, tested, and accepted.

1.08 MOCKUP

- A. Provide spray polyurethane foam insulating air barrier as part of exterior wall assembly mockup. See Section 04 20 00 and Drawings for requirements.
- B. See Section 01 40 00 - Quality Requirements for additional requirements.
- C. Locate where directed.
- D. Mock-up may not remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, expiration date, and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air/vapor barrier manufacturer. Protect stored materials from direct sunlight.
- C. Avoid spillage. Immediately notify Owner, Architect if spillage occurs and start clean up procedures.
- D. Clean spills and leave area as it was prior to spill.

1.10 WASTE MANAGEMENT AND DISPOSAL

- A. Place materials defined as hazardous or toxic waste in designated containers.
- B. Ensure emptied containers are sealed and stored safely for disposal.

1.11 PROJECT CONDITIONS

- A. Environmental Conditions: Apply air/vapor barrier within range of ambient and substrate temperatures recommended by air/vapor barrier manufacturer. Do not apply air/vapor barrier to a damp or wet substrate, unless the manufacturer specifically permits that for the product.
 1. Do not apply air/vapor barrier in snow, rain, fog, or mist.
 2. Do not apply air/vapor barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.
 3. The product shall not be installed after the expiry date printed on the label of each container. The product has a shelf life of 6 months from the date of manufacture.

1.12 WARRANTY

- A. System Warranty: Provide the manufacturer's three year system warranty, including the primary air/vapor barrier and installed accessory sealant and membrane materials which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.01 MATERIALS & MANUFACTURERS

- A. Sprayed polyurethane foam material, when tested, shall meet the requirements of ULC S705.1-01 Standard for Thermal Insulation-Spray Applied Rigid Polyurethane Foam, Medium Density, Material- Specification.
- B. A copy of an Evaluation Report (such as the CCMC Evaluation Report) or copies of the test reports from an accredited testing laboratory, for each physical property, indicating that the product meets the requirements of ULC S705.1-01 shall be made available upon request.
- C. Material containers shall be labeled with the Evaluation Report number of the evaluation agency.
- D. Design R-value as indicated in test report; minimum R6.9/inch.
- E. Density as indicated in test report: minimum 1.7 pounds per cubic foot.
- F. Smoke development as indicated in test report; less than 500 when tested under ULC S102.
- G. Products that meet the preceding requirements:
 - 1. Basis-of-design product: Walltite closed cell spray foam polyurethane air/vapor barrier as manufactured by BASF (215-966-1168).
- H. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another manufacturer with approved submittal meeting the design criteria:
 - 1. Icynene: www.icynene.com
- I. Substitutions: See Section 01 60 00 - Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.02 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended by air/vapor barrier manufacturer for intended use and compatible with the air/vapor barrier.
- B. Transition Membrane: Self-adhering, smooth surfaced SBS modified bitumen membrane, nominal 40 mil thickness, width as required, to detail all rough openings, changes in material substrates, and penetrations.
 - 1. Blueskin SA as manufactured by Henry Company Inc
 - 2. Butyl-based peel and stick membrane: Transition between air/vapor barrier membrane and TPO or EPDM membranes:
 - a. Blueskin SA as manufactured by Henry Company Inc.
 - 3. Primer: Water based liquid primer for concrete, masonry, gypsum sheathing, wood, metal, and painted substrates;
 - a. Aquatac as manufactured by Henry Company Inc.
 - 4. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes approved by foamed in place air/vapor barrier manufacturer.
 - 5. Sheet Membrane Transition Strip Termination Sealant:
 - a. BES 925 Sealant by Henry Company Inc.
 - 6. Sheet Membrane Sheet Membrane Air Barrier Perimeter Seal to Windows, Doors: Low modulus silicone sheet; provide manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit widths indicated, combined with a neutral-curing low modulus silicone sealant for bonding extrusions to substrates.
 - a. Pecora Sil-Span.

- b. Dow 1-2-3 or equal.
- 7. Provide sealants in accordance with Section 079200 - Joint Sealants. Comply with ASTM C920 and ASTM C920 classifications for type, grade, class, and uses.
 - a. Silicone Sealant: natural cure, low modulus, to seal sheet membrane flashing to polyethylene face of sheet rubberized-asphalt barrier and to seal between and to non-bituminous sheet systems.
 - 1) Acceptable materials:
 - (a) Dow 790
 - (b) Pecora 864
 - b. SPF (Sprayed Polyurethane Foam) Sealant: Provide one- or two-component, foamed-in-place, polyurethane foam sealant with the following characteristics:
 - 1) Density: 1.5 to 2.0 PCF.
 - 2) Flame Spread (ASTM E162): 25 or less.
 - 3) Initial R-Value (at 1 inch): Not less than 7.
 - 4) Acceptable materials:
 - (a) Zerodraft Foam Sealant.
 - (b) Zerodraft Insulating Air Sealant
 - 5) Zerodraft (Division of Canam Building Envelope Specialists Inc.), 125 Traders Blvd. E., Unit # 4, Mississauga, ON, L4Z 2H3 Tel. 1-877-272-2626
 - c. Substrate Cleaner: Non-corrosive compatible with adjacent materials.
- C. Intumescent Coating
 - 1. Intumescent Coating: ICP Construction Fireshell F10E
 - 2. Topcoat: Fireshell F1
 - 3. Substitutions: Equivalent coatings and topcoats are acceptable contingent upon NFPA 285 testing reports using project-specific wall system assembly components. Submit in accordance with Section 01 60 00 - Product Requirements .

2.03 EQUIPMENT

- A. The equipment used to spray the polyurethane foam material shall be in accordance with ULC S705.2-02 and the equipment manufacturer's recommendations for specific type of application.
- B. Equipment settings are to be recorded on the Daily Work Record as required by the ULC S705.2-02 Installation standard.
- C. Each proportioner unit to supply only one spray gun.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions under which air/vapor barrier systems will be applied, with Installer present, for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Ensure that:
 - 1. surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants
 - 2. concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
 - 3. masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.

4. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
5. Notify Architect in writing of anticipated problems using air/vapor barrier over substrate.

3.02 SURFACE PREPARATION

- A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air/vapor barrier application.
- B. Prime ICBP metal substrates with conditioning primer when installing modified asphalt membrane transition membranes.
- C. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air/vapor barrier and at protrusions according to air/vapor barrier manufacturer's written instructions.
 1. Verify that surfaces and conditions are suitable to accept work as outlined in this section.
 2. Commencement of work outlined in this section shall be deemed as acceptance of existing work and conditions.
 3. Examine joints before sealing to ensure configurations, surfaces and widths are suitable for spray polyurethane foam. Report in writing all defects stating the locations of joints deemed unacceptable for the application of the spray polyurethane foam.

3.03 PREPARATION

- A. Protection:
 1. Mask and cover adjacent areas to protect from over spray.
 2. Ensure any required foam stop or back up material are in place to prevent over spray and achieve complete seal.
 3. Seal off existing ventilation equipment. Install temporary ducting and fans to ensure exhaust fumes. Provide for make-up air.
 4. Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spray area.
 5. Surface Preparation
 - a. Surfaces to receive foam insulation shall be clean, dry and properly fastened to ensure adhesion of the polyurethane foam to the substrate.
 - b. Ensure that all work by other trades that may penetrate through the air barrier system is in place and complete.
 - c. Ensure that surface preparation and any primers required conform to the manufacturer's instructions.
 - d. Prepare surfaces by brushing, scrubbing. Scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion and integrity of the spray polyurethane foam. Wipe down metal surfaces to remove release agents or other non-compatible coatings, using clean sponges or rags soaked in a solvent compatible with the spray polyurethane foam. Ensure surfaces are dry before proceeding.
 - e. Install transition membranes around and into all rough openings, to all materials penetrating the exterior wall to all applicable surfaces and ensure proper adhesion of the transition membranes to the substrate, capable of having spray polyurethane foam insulation.
 - f. Install counter-flashings:
 - 1) Metal: Mechanically fasten metal counter-flashings with screws at 8" (200 mm) o.c.

- 2) Membrane: Cut into and uncover only 3” of siliconized release paper along one edge of the counter-flashing membrane. Adhere membrane flashing to the pre-primed substrate a minimum of 3” and roll firmly in place.

g. Ensure veneer anchors are in place.

3.04 APPLICATION

- A. Spray-application of polyurethane foam shall be installed in accordance with ULC S705.2-02 and the manufacturer's instructions.
- B. Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer and the ULC S705.2 Installation standard.
- C. Apply in consecutive passes as recommended by manufacturer to thickness as indicated on drawings. Passes shall be not less than ½ inch and not greater than 2 inches.
- D. Do not install spray polyurethane foam within 3 inches of heat emitting devices such as light fixtures and chimneys.
- E. Finished surface of foam insulation to be free of voids and embedded foreign objects.
- F. Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.
- G. Trim, as required, any excess thickness that would interfere with the application of cladding/covering system by other trades.
- H. Clean and restore surfaces soiled or damaged by work of the section. Consult with section of work soiled before cleaning to ensure methods used will not damage the work.
- I. Do not permit adjacent work to be damaged by work of this section. Damage to work of this section caused by other sections shall be repaired by this section at the expense of the subcontractor causing the damage.
- J. Complete connections to other components or repair any gaps, holes or other damage using material which conforms to ULC S710.1 Polyurethane Sealant Foam - One Component - Material or ULC S711.1 Polyurethane Sealant Foam - Two Components - Material and shall be installed in accordance with ULC S710.2 Polyurethane Sealant Foam - One component - Installation or ULC S711.2 Polyurethane Sealant Foam - Two Component - Installation, whichever is appropriate.
- K. At all locations, install intumescent paint and topcoat to required wet or dry mil thickness or coverage rate in accordance with manufacturer’s instructions, by brush, roller, conventional or airless spray.

3.05 TOLERANCES

- A. Maximum variation from indicated thickness: minus (-) ¼ inch; plus (+) ½ inch.

3.06 PROTECTION

- A. Cover the spray polyurethane foam with a thermal barrier when installed on the interior of the building.

END OF SECTION 07 26 40

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SECTION 07 42 13.13
METAL WALL AND ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exposed fastener metal roof panels.

1.02 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim : Sheet metal flashings, reglets and roof drainage items.
- B. Section 07 71 00 - Roof Specialties : Copings and fascia that are not part of wall panel system.
- C. Section 07 92 00 - Joint Sealants: Field-applied joint sealants.

1.03 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA):
 - 1. AAMA 620 - Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum Substrates.
- B. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM):
 - 1. ASTM A 653/A 653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 666 – Standard specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 3. ASTM B 209 - Specification for Aluminum and Aluminum Alloy Sheet and Plate.
 - 4. ASTM C 754 - Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
 - 5. ASTM C 920 - Specification for Elastomeric Joint Sealants.
 - 6. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
 - 7. ASTM E 283 - Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
 - 8. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
 - 1. Architectural Sheet Metal Manual.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide metal wall panel assemblies meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.
- B. Air Infiltration: When installed over Insulated Composite Backup Panels or Metal Liner Panels, maximum 0.06 cfm/sq. ft. (0.3 L/s per sq. m) per ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa), using minimum 10-by-10 foot (3050-by-3050 mm) test panel that includes side joints.
- C. Water Penetration, Static Pressure: When installed over Insulated Composite Backup Panels or Metal Liner Panels, no uncontrolled water penetration per ASTM E 331 at a minimum static

differential pressure of 6.24 lbf/sq. ft. (299 Pa), using minimum 10-by-10 foot (3050-by-3050 mm) test panel that includes side joints.

- D. Maximum allowable deflection limitation.
 - 1. Single Skin Panels greater than 1-inch (25-mm) in Depth: Limited to L/120 deflection of panel perimeter normal to plane of wall.
- E. Secondary Metal Framing: Design secondary metal framing for metal wall panel assembly according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
- F. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.
- G. Wall systems that incorporate foam plastic insulation must be tested by the foam plastic supplier in accordance with NFPA-285.

1.05 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal wall panel and panel accessories from a single manufacturer.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum 10 years experience in manufacture of similar products in successful use in similar applications.
- C. Wall Systems Installer Qualifications: Experienced Installer with minimum of 5 years experience with successfully completed projects of a similar nature and scope.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's representative, and other trade contractors.
 - 1. Coordinate building framing in relation to metal wall panel assembly.
 - 2. Coordinate installation of building air and water barrier behind metal wall panel assembly.
 - 3. Coordinate window, door and louver, and other openings and penetrations of metal wall panel assembly.

1.07 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets, for specified products.
 - 1. Include data indicating compliance with performance requirements.
- B. Shop Drawings: Provide shop drawings prepared by manufacturer or manufacturer's authorized Installer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 1-1/2-inch per foot (1:8) of all required trim and extrusions needed for a complete installation.
 - 1. Indicate points of supporting structure that must coordinate with metal wall panel assembly installation.
- C. Samples for Initial Selection: For each product specified. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 12-inch (300 mm) section of panel(s) showing finishes. Provide 12-inch (300 mm) long pieces of trim pieces and other exposed components.

1.08 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency.
- B. Qualification Information: For Installer firm.
- C. Manufacturer's warranty: Submit sample warranty.

1.09 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect metal wall panel products during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage.
 - 1. Deliver, unload, store, and erect metal wall panel products and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

1.11 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials and workmanship within 10 years from date of Substantial Completion.
- B. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal wall panels that display evidence of deterioration of finish within 20 years from the date of substantial completion.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Metal Roof Panels over Uninsulated Steel-Framing: Single-skin exposed fastener metal roof panels applied as roof decking over steel framing specified in Division 05 Section "Structural Steel Fabrications" Metal roof panel installation specified in this Section include secondary metal subgirt framing and gutters, trim and fascia.
- B. Metal Wall Panels over Uninsulated Steel Framed Wall System: Single-skin exposed fastener metal wall panels applied as exterior barrier cladding over wall framing . Metal wall panel installation specified in this Section may include secondary metal subgirt framing for panel attachment.

2.02 MANUFACTURERS

- A. Basis of Design: CENTRIA, Exposed Fastener Series Metal Wall and Roof Panels. Provide basis of design product, or comparable product approved by Architect prior to bid.
 - 1. CENTRIA Architectural Systems; Moon Township, PA 15108-2944. Tel: (800)759-7474. Tel: (412)299-8000. Fax: (412)299-8317. Email: info@CENTRIA.com. Web: www.CENTRIA.com.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements .
- B. Subject to compliance with requirements, equivalent products of the following manufacturers are also approved:
 - 1. Morin, A Kingspan Company: www.morincorp.com
 - 2. Metl Span, a NuCor Company: www.metlspan.com

2.03 METAL WALL AND ROOF PANEL MATERIALS

- A. Aluminum Face Sheet: Smooth surface coil-coated, ASTM B 209, 3003-H14 or 5052-H32 alloy.
 - 1. Face Sheet: 0.050 inch (1.27 mm) nominal thickness.
 - 2. Surface: Smooth

2.04 EXPOSED FASTENER PROFILE METAL WALL AND ROOF PANELS

- A. Metal Wall and Roof Panels, General: Factory-formed, Exposed fastener panels with interconnecting side joints, fastened to supports with exposed fasteners, with field-applied sealants in side laps when required to meet performance requirements.
- B. Ribbed profile with lap joint:
 - 1. Basis of Design Product: CENTRIA, Style-Rib.
 - 2. Panel Coverage: 36 inches.
 - 3. Panel Height: 1 1/2 inches (76 mm).
 - 4. Rib Spacing: 7.2 inches (305 mm) o.c.
- C. Exposed Coil-Coated Finish System:
 - 1. Fluoropolymer Three-Coat System: 0.8 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, and a 0.8 mil 70 percent PVDF fluoropolymer clear coat, AAMA 620.
 - a. Basis of Design: CENTRIA Duragard Plus.
- D. Color:
 - 1. Exterior Surface: As selected by Architect from manufacturer's standard colors.
 - 2. Interior Surface: As selected by Architect from manufacturer's standard colors.

2.05 SECONDARY METAL FRAMING

- A. Miscellaneous Framing Components, General: Cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z180).
 - 1. Hat Channels: 0.06 inch/16 ga. (1.52 mm) minimum – nominal thickness.
 - 2. Sill Channels: 0.06 inch/16 ga. (1.52 mm) minimum – nominal thickness.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine metal wall panel substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal wall panels.
- B. Wall Substrate: Confirm that wall substrate is within tolerances acceptable to metal wall panel system manufacturer.
 - 1. Maximum deviations acceptable:
 - a. 1/4-inch in 20 feet (6.4 mm in 6 m) vertically or horizontally from face plane of framing.
 - b. 1/2-inch (12.7 mm) across building elevation.
 - c. 1/8-inch in 5 feet (3.2 mm in 1.5 m).
- C. Framing: Inspect framing that will support metal wall panels to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal wall panels.
- D. Openings: Verify that windows, doors, louvers and other penetrations match layout on shop drawings.
- E. Advise G.C, in writing, of out-of-tolerance work and other deficient conditions prior to proceeding with metal wall panel system installation.
- F. Correct out of tolerance work and other deficient conditions prior to panel installation.

3.02 SECONDARY FRAMING INSTALLATION

- A. Secondary Metal Framing: Install secondary metal framing components to tolerances indicated, as shown on approved shop drawings. Install secondary metal framing and other metal panel supports per ASTM C 1007 and metal wall panel manufacturer's recommendations.

3.03 METAL WALL AND ROOF PANEL INSTALLATION

- A. General: Install metal wall and roof panels in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall and roof panels in orientation, sizes, and locations indicated. Anchor metal wall and roof panels and other components securely in place.
- B. Attach panels to metal framing using recommended screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
 - 1. Fasteners for Steel Wall Panels: Stainless-steel for exterior locations and locations exposed to moisture; carbon steel for interior use only.
 - 2. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
 - 3. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- C. Joint Sealers: Install joint sealants where indicated on approved shop drawings.

3.04 ACCESSORY INSTALLATION

- A. General: Install metal wall panel accessories with positive anchorage to building. Coordinate installation with flashings and other components.
 - 1. Install related flashings and sheet metal trim per requirements of Division 07 Section "Sheet Metal Flashing and Trim."
 - 2. Install components required for a complete metal wall panel assembly, including trim, copings, corners, lap strips, flashings, sealants, fillers, closure strips, and similar items.
 - 3. Comply with performance requirements and manufacturer's written installation instructions.
 - 4. Set units true to line and level as indicated.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written report.
- B. Correct deficiencies noted in manufacturer's report.

3.06 CLEANING AND PROTECTION

- A. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.
- B. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

END OF SECTION 07 42 13.13

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SECTION 07 42 13.23
METAL COMPOSITE MATERIAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior cladding consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup.
- B. Decorative metal composite material (MCM) facade elements and column covers.
- C. Matching flashing and trim.

1.02 RELATED REQUIREMENTS

- A. Section 07 25 00 - Weather Barriers: Water-resistive barrier behind wall panel system.
- B. Section 07 26 40 - Spray Polyurethane Foam Insulating Air Barrier
- C. Section 07 42 13.13 - Metal Wall and Roof Panels not specified in this Section.
- D. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.
- E. Section 07 92 00 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Alternates:
 - 1. See Section 01 23 00 - Alternates for product alternates affecting this section.

1.04 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Amendments and Errata.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- F. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- G. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2023.
- H. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2023a.
- I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- J. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- K. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.
- L. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).

- M. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives; 1998 (Reapproved 2012).
- N. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2023.
- O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- P. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- Q. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- R. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).
- S. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, coordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.
 - 1. Require attendance by the installer and relevant sub-contractors.
 - 2. Include MCM sheet manufacturer's representative and wall system manufacturer's representative to review storage and handling procedures.
 - 3. Review in detail truck transportation, parking, vertical transportation, schedule, personnel, installation of adjacent materials and substrate.
 - 4. Review procedures for protection of work and other construction.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
 - 1. Finish manufacturer's data sheet showing physical and performance characteristics.
 - 2. Storage and handling requirements and recommendations.
 - 3. Fabrication instructions and recommendations.
 - 4. Specimen warranty for finish, as specified herein.
- C. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
 - 1. Physical characteristics of components shown on shop drawings.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions and recommendations.
 - 4. Specimen warranty for wall system, as specified herein.
- D. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, support clips, exposed fasteners, number of anchors, supports, reinforcement, trim, flashings, and accessories.
 - 1. Indicate panel numbering system.
 - 2. Differentiate between shop and field fabrication.
 - 3. Indicate substrates and adjacent work with which the wall system must be coordinated.

4. Include large-scale details of anchorages and connecting elements.
5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches (1:10).
6. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- E. Selection Samples: For each finish product specified, submit at least two sample color chips representing manufacturer's standard range of available colors and patterns.
 1. Sealant Color: Color to match wall panels.
- F. Verification Samples: For each finish product specified, submit at least two samples, minimum size 12 inch (305 mm) square, and representing actual product in color and texture.
- G. Design Data: Submit structural calculations stamped by design engineer, for Architect's information and project record.
- H. Test Report: Submit report of full-size mock-up tests for air infiltration, water penetration, and wind performance.
- I. Test Report: Submit test report verifying compliance with NFPA 285 for previously-tested exterior wall assembly.
- J. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.
- K. Manufacturer's qualification statement.
- L. Installer's qualification statement.
- M. Testing agency's qualification statement.
- N. Maintenance Data: Care of finishes and warranty requirements.
- O. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- P. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.07 QUALITY ASSURANCE

- A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
- B. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications: Company specializing in manufacturing wall panel systems specified in this section.
 1. With not less than five years of documented experience.
 2. Approved by MCM sheet manufacturer.
- D. Installer Qualifications: Company specializing in performing work of type specified in this section.
 1. With minimum five years of documented experience.
 2. Approved by wall panel system manufacturer.
- E. Testing Agency Qualifications: Independent agency experienced in testing assemblies of the type required for this project and having the necessary facilities for full-size mock-up testing of the type specified.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
 - 1. Protect finishes by applying heavy-duty removable plastic film during production.
 - 2. Package for protection against transportation damage.
 - 3. Provide markings to identify components consistently with drawings.
 - 4. Exercise care in unloading, storing, and installing panels to prevent bending, warping, twisting, and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Store in well-ventilated space out of direct sunlight.
 - 2. Protect from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
 - 3. Store at a slope to ensure positive drainage of accumulated water.
 - 4. Do not store in enclosed space where ambient temperature can exceed 120 degrees F (49 degrees C).
 - 5. Avoid contact with other materials that might cause staining, denting, or other surface damage.

1.09 FIELD CONDITIONS

- A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Special Warranty: Provide 5-year warranty covering water tightness and integrity of seals of wall panels. Complete forms in Owner's name and register with warrantor.
- C. Finish Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Composite Material (MCM) Sheet Manufacturers:
 - 1. ALUCOBOND by 3A Composites USA; ALUCOBOND PLUS:
www.alucobondusa.com/#sle.
- B. Wall Panel System Manufacturers:
 - 1. ACM Panelworx Inc; EVO Rivetless Dry Joint Rain Screen:
www.acmpanelworx.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 WALL PANEL SYSTEM

- A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by others; provide installed panel system capable of maintaining specified performance without defects, damage, or failure.
 - 1. Provide structural design by or under direct supervision of a Structural Engineer licensed in the State in which the Project is located.
 - 2. Provide panel jointing and weatherseal using reveal joints and gaskets but no sealant.
 - 3. Anchor panels to supporting framing without exposed fasteners.

2.03 PERFORMANCE REQUIREMENTS

- A. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F (minus 29 degrees C) to 180 degrees F (82 degrees C) without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.
 - 1. Wind Performance: Provide system tested in accordance with ASTM E330/E330M without permanent deformation or failures of structural members under the following conditions:
 - 2. Design Wind Pressure: In accordance with local building code.
 - a. Refer to Structural Drawings for additional information.
- B. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage when tested at 6.24 psf (300 Pa) pressure difference in accordance with ASTM E283/E283M.
- C. Water Penetration: No water penetration under static pressure when tested in accordance with ASTM E331 at a differential of 10 percent of inward acting design load, 6.27 psf (300 Pa) minimum, after 15 minutes.
 - 1. Water penetration is defined as the appearance of uncontrolled water on the interior face of the wall.
 - 2. Design to drain leakage and condensation to the exterior face of the wall.
- D. Fire Performance: Use test method complying with NFPA 285.
- E. Building Envelope Performance: Comply with ASHRAE Std 90.1 I-P when tested as part of building envelope assembly.

2.04 PANELS

- A. Panels: 1 inch (25.4 mm) deep pans formed of metal composite material sheet by routing back edges of sheet, removing corners, and folding edges.
 - 1. Reinforce corners with riveted aluminum angles.
 - 2. Provide concealed attachment to supporting structure by adhering attachment members to back of panel; attachment members may also function as stiffeners.
 - 3. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.
 - 4. Secure members to back face of panels using structural silicone sealant approved by MCM sheet manufacturer.
 - 5. Fabricate panels under controlled shop conditions.
 - 6. Where final dimensions cannot be established by field measurement before commencement of manufacturing, make allowance for field adjustments without requiring field fabrication of panels.
 - 7. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
 - a. Make panel lines, breaks, curves, and angles sharp and true.
 - b. Keep plane surfaces free from warp or buckle.
 - c. Keep panel surfaces free of scratches or marks caused during fabrication.
 - 8. Provide joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on inside face of panel system.
 - 9. For "dry" jointing, secure extrusions to returned pan edges with stainless steel rivets; provide means of concealed drainage with baffles and weeps for water that might accumulate in members of system.

2.05 MATERIALS

- A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.
1. Overall Sheet Thickness: 0.157 inch (4 mm), minimum.
 2. Face Sheet Thickness: 0.020 inch (0.51 mm), minimum.
 3. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch (100 N-mm/mm) with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
 4. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 5. Flammability: Self-ignition temperature of 650 degrees F (343 degrees C) or greater when tested in accordance with ASTM D1929.
- B. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
1. Provide material strength, dimensions, configuration as required to meet applied loads and in compliance with applicable building code.
 2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.

2.06 FINISHES

- A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, with at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss as indicated.
- B. Color/Texture: As selected by Architect from manufacturer's full range. Basis of Design colors and finishes are as follows:
1. Color : Market Pearl White Mica
 2. Refer to Section 01 20 00 for Alternates related to color selections.

2.07 ACCESSORIES

- A. Flashing: Sheet aluminum; 0.040 inch (1.0 mm) thick, minimum; finish and color to match MCM sheet; see Section 07 62 00 for additional requirements.
- B. Support for Cladding and Continuous Insulation: Continuous thermal Z-girts.
1. Fiberglass reinforced plastic (FRP) girts that provide cladding attachment support for exterior wall cladding and metal wall panels.
 2. Depth: As indicated on drawings.
 3. Spacing: 24 inches (610 mm) on center, vertically.
 4. Fasteners: As recommended by clip manufacturer.
- C. Anchors, Clips, and Accessories: Use one of the following:
1. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, or ASTM A666/A666M.
 2. Steel complying with ASTM A36/A36M and hot-dip zinc coating to ASTM A153/A153M.
 3. Steel complying with ASTM A36/A36M and hot-dip galvanized to ASTM A123/A123M, with Coating Thickness Grade of 100.
- D. Fasteners:

1. Exposed Fasteners: Stainless steel; permitted only where absolutely unavoidable and subject to prior approval of the Architect.
 2. Screws: Self-drilling or self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
 3. Bolts: Stainless steel.
 4. Fasteners for Flashing and Trim: Blind fasteners of high-strength aluminum or stainless steel.
- E. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 15-mil (0.38 mm) dry film thickness per coat.
- F. Joint Sealer: Provide color to match wall panels silicone sealant of type approved by MCM sheet manufacturer, and in compliance with ASTM C920.
1. See Section 07 92 00 for additional requirements.
- G. Provide panel system manufacturer's and installer's standard corrosion resistant accessories, including fasteners, clips, anchorage devices, and attachments.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine dimensions, tolerances, and interfaces with other work.
 1. Verify that weather barrier system is properly installed; see Section 07 25 00 for requirements.
- B. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protect adjacent work areas and finish surfaces from damage during installation.
- B. Provide anchorage items to be cast into concrete or built into masonry to appropriate installer(s) together with setting templates.

3.03 INSTALLATION

- A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.
- C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.
- D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.
- E. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.

- F. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.
- G. Where joints are designed for field-applied sealant, seal joints completely with specified sealant.
- H. Install flashings as indicated on shop drawings. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.
- I. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
 - 1. Variation From Plane or Location: 1/2 inch in 30 feet (10 mm in 10 m) of length and up to 3/4 inch in 300 feet (20 mm in 100 m), maximum.
 - 2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch (0.75 mm), maximum.
- J. Replace damaged products.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.

3.05 CLEANING

- A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Clean installed products in accordance with manufacturer's instructions.

3.06 PROTECTION

- A. Protect installed panel system from damage until Date of Substantial Completion.

END OF SECTION 07 42 13.23

SECTION 07 53 00
ELASTOMERIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Elastomeric roofing membrane, adhered conventional application.
- B. Insulation, flat and tapered.
- C. Air barrier/vapor retarder.
- D. Cover boards.
- E. Roofing stack boots, roofing expansion joints, and walkway pads.

1.02 RELATED REQUIREMENTS

- A. Section 05 31 00 - Steel Decking: Placement of acoustical insulation for deck flutes.
- B. Section 06 10 00 - Rough Carpentry: Wood blockings.
- C. Section 07 71 00 - Roof Specialties: Manufactured roof specialties, including copings and fascias.

1.03 REFERENCE STANDARDS

- A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
- B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.
- C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-- Tension; 2016 (Reapproved 2021).
- D. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2020).
- E. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact; 2020.
- F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- G. FM (AG) - FM Approval Guide; Current Edition.
- H. FM DS 1-28 - Wind Design; 2015, with Editorial Revision (2022).
- I. NRCA (RM) - The NRCA Roofing Manual; 2023.
- J. NRCA (WM) - The NRCA Waterproofing Manual; 2021.
- K. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, and fasteners.

- C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and mechanical fastener layout.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- F. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- G. Installer's qualification statement.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience, and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- B. Store materials in weather protected environment, clear of ground and moisture.
- C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- D. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F (5 degrees C) or above 90 degrees F (___ degrees C).
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- E. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.
- F. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.
- G. Do not allow grease, oil, fats, or other contaminants to come into direct contact with membrane.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form signed by Installer, covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.
- C. Manufacturer's Warranty: Manufacturer's Warranty standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 1. Warranty Period: 30 years from date of Substantial Completion.
 2. Coverage: Material and labor, no dollar limit, non-pro-rated.
 3. Include edge metal in Roofing System Warranty. See Section 07 71 00.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. EPDM Membrane Materials:
 1. Basis of Design: Carlisle SynTec Systems; Sure-Seal EPDM: www.carlisle-syntec.com/#sle.
 2. Elevate; Low Slope Fire Retardant (LSFR) RubberGard EPDM Membrane: www.holcimelevate.com/#sle.
 3. Versico Roofing Systems; VersiGard EPDM: www.versico.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
 5. Subject to compliance with requirements, the following manufacturers are also approved:
 - a. Johns Manville, 90 mil EPDM NR.

2.02 ROOFING

- A. Elastomeric Membrane Roofing: One ply membrane, fully adhered, over insulation and cover board.
- B. Roofing Assembly Requirements:
 1. Roof Covering External Fire Resistance Classification: UL (DIR) certified Class A.
 2. Factory Mutual Classification: Class 1 and windstorm resistance of 1-90, in accordance with FM DS 1-28.
 3. Insulation Thermal Resistance (R-Value): Provide R-30, minimum, over entire roof deck.
 4. Drainage: No standing water within 48 hours after precipitation.
- C. Acceptable Insulation Types Constant Thickness and Tapered Application:
 1. Minimum 2 layers of polyisocyanurate board.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: Ethylene-propylene-diene-terpolymer (EPDM); non-reinforced; complying with minimum properties of ASTM D4637.
 1. Thickness: 0.090 inch (90 mil) (2.3 mm).
 2. Sheet Width: 120 inches (3,048 mm), minimum; factory fabricate into widest possible sheets.
 3. Color: Black.
 4. Tensile Strength: 1305 psi (9.0 MPa), minimum, measured in accordance with ASTM D412.
 5. Ultimate Elongation: 300 percent, minimum, measured in accordance with ASTM D412.
 6. Tear Strength: 150 lbf per inch (26.3 kN/m), measured in accordance with ASTM D624.
 7. Water Vapor Permeability: 0.10 perm inch (5.74 ng/(Pa s m)), measured in accordance with ASTM E96/E96M.
 8. Brittleness Temperature: -49 degrees F (-45 degrees C), measured in accordance with ASTM D746.

- B. Seaming Materials: Standard synthetic-rubber polymer primer and 6-inch wide minimum, butyl splice tape with release film.
- C. Membrane Fasteners: As recommended by and approved by membrane manufacturer.
- D. Flexible Flashing Material: Same material as membrane.
 - 1. Tensile Strength: 1,200 psi (8.3 MPa).
 - 2. Elasticity: 50 percent with full recovery without set.
 - 3. Color: match membrane color.

2.04 COVER BOARDS

- A. Cover Boards: Glass-mat faced gypsum panels complying with ASTM C1177/C1177M.
 - 1. Thickness: 5/8 inch (15.9 mm), Type X, fire-resistant.
 - 2. Products:
 - a. Georgia-Pacific; DensDeck Prime Roof Boards with EONIC Technology:
www.densdeck.com/#sle.
 - b. USG Corporation; Securock Ultralight Coated Glass-Mat Roof Board:
www.usg.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 - d. Subject to compliance with requirements, the following manufacturers are also approved:
 - 1) Johns Manville, DensDeck Prime.

2.05 INSULATION

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
 - 1. Classifications:
 - a. Type II: Faced with either cellulosic facers or glass fiber mat facers on both major surfaces of the core foam.
 - 1) Class 1 - Faced with glass fiber reinforced cellulosic facers on both major surfaces of the core foam.
 - 2) Compressive Strength: Classes 1-2-3, Grade 3 - 25 psi (172 kPa), minimum.
 - 3) Thermal Resistance, R-value (RSI-value): At 1-1/2 inches (38 mm) thick; Class 1, Grades 1-2-3 - 8.4 (1.48) at 75 degrees F (24 degrees C).
 - 2. Board Size: 48 by 48 inches (1220 by 1220 mm).
 - 3. Board Thickness: 2.0 inch (50 mm) base layer.
 - 4. Tapered Board: Slope as indicated; minimum thickness 1/2 inch (12.7 mm); fabricate of fewest layers possible. 5.0 inch minimum thickness at drains.
 - 5. Pre-formed sumps at drains: 4'-0" square; 1/2" per foot slope.
 - 6. Board Edges: Square.

2.06 ACCESSORIES

- A. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- B. Prefabricated Flashing Accessories:
 - 1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
 - 2. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
- C. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches (152 mm) wide; self adhering.
- D. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
- E. Membrane Adhesive: As recommended by membrane manufacturer.

1. Provide low-VOC, solvent-based EPDM bonding adhesive that complies with Ozone Transport Commission (OTC) Model Rule, Single Ply Roofing Adhesives; www.otcair.org.
- F. Membrane Adhesive Primer: As recommended by membrane manufacturer, and:
 1. Provide low-VOC, solvent-based EPDM bonding adhesive that complies with Ozone Transport Commission (OTC) Model Rule, Single Ply Roofing Adhesives; www.otcair.org.
- G. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
- H. Insulation Adhesive: As recommended by insulation manufacturer.
- I. Sealants: As recommended by membrane manufacturer.
- J. Walkway Pads: Suitable for maintenance traffic, visually distinctive from roof membrane.
 1. Composition: Roofing membrane manufacturer's standard.
 2. Size: 30 by 30 inches (762 by 762 mm).
 3. Surface Color: Contrasting with roof membrane color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify surface is supported and secure.
- C. Verify surface is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify surface is dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION - METAL DECK

- A. Install preformed acoustical glass fiber insulation strips in roof deck flutes in accordance with manufacturer's instructions; see Section 05 31 00.

3.03 INSTALLATION - GENERAL

- A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Do not apply roofing membrane during unsuitable weather.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- F. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

3.04 INSTALLATION - INSULATION, UNDER MEMBRANE

- A. Attachment of Insulation: Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.

1. At areas with exposed structure below, size fasteners for a maximum $\frac{3}{4}$ inch penetration below deck, and locate in top flute of deck.
2. At areas with acoustical deck, size fasteners so that they do not penetrate the bottom surface of the deck.
3. Embed second layer of insulation into full bed of adhesive in accordance with roofing and insulation manufacturers' instructions.
 - a. At contractor's option, second layer of insulation may be mechanically fastened in areas without exposed ceilings.
- B. Lay subsequent layers of insulation with joints staggered minimum 6 inches (152 mm) from joints of preceding layer.
- C. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- D. On metal deck, place boards _____ to flutes with insulation board edges bearing on deck flutes.
- E. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- F. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
- G. At roof drains, use to slope down to roof drains over a distance of 24 inches (610 mm).
 1. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- H. Cover Boards: Embed cover boards into full bed of adhesive in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.
 1. Install cover board over insulation with long joints in continuous straight lines with end joints staggered between rows.
 2. For multilayer locations, lay subsequent coverboard layers with joints staggered minimum 6 inch from joints of preceding layer.
- I. Do not apply more insulation than can be covered with membrane in same day.

3.05 INSTALLATION - MEMBRANE

- A. Install elastomeric membrane roofing system in accordance with manufacturer's recommendations and NRCA (WM) applicable requirements.
- B. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- C. Shingle joints on sloped substrate in direction of drainage.
- D. Fully Adhered Application: Apply adhesive to substrate at rate recommended by the manufacturer. Fully embed membrane in adhesive except in areas directly over or within 3 inches (75 mm) of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- E. Overlap edges and ends and seal seams by contact tape or factory applied seam tape, minimum 6 inches (152 mm). Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- F. At intersections with vertical surfaces:
 1. Extend membrane up a minimum of 8 inches (203 mm) onto vertical surfaces.
 2. Fully adhere flexible flashing over membrane and up to termination bar.
 3. Secure flashing under termination bar at 12 inches (304 mm) on center, or as recommended by manufacturer.
 4. Insert flashing into reglets and secure.
- G. At roof edges, extend membrane under gravel stop and to the outside face of the wall.
- H. Around roof penetrations, seal flanges and flashings with flexible flashing.

- I. Install roofing expansion joints where indicated. Make joints watertight.
 - 1. Install prefabricated joint components in accordance with manufacturer's instructions.
- J. Coordinate installation of roof drains and related flashings.
- K. Coordinate installation of associated counterflashings installed under other sections.

3.06 ROOF WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Provide weekly on-site attendance of roofing manufacturer's representative during installation of this work.

3.08 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Remove wrappings, empty containers, paper, and other debris from the roof daily. Dispose of debris in compliance with local, State, and Federal regulations.
- C. Remove markings from finished surfaces.
- D. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- E. Repair or replace defaced or damaged finishes caused by work of this section.

3.09 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07 53 00

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SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings and counterflashings.
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Installation of flashing materials embedded in masonry.
- B. Section 07 25 00 - Weather Barriers: Installation of weather barriers and interface with flashing materials.
- C. Section 07 53 00 - Elastomeric Membrane Roofing: Flashings for membrane roofing
- D. Section 07 71 23 - Manufactured Gutters and Downspouts.

1.03 REFERENCE STANDARDS

- A. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- D. ASTM B32 - Standard Specification for Solder Metal; 2020.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).
- F. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a (Reapproved 2021).
- G. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- H. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples 6 by 6 inch (___by___ mm) in size illustrating metal finish color.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage (0.032 inch) (0.81 mm) thick; plain finish shop pre-coated with fluoropolymer coating.
 - 1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from manufacturer's full colors.
- B. Stainless Steel: ASTM A666/A666M, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch (0.40 mm) thick; smooth No. 4 - Brushed finish.

2.02 FLASHING TYPES

- A. Flashing Type 1: Two-piece interlocking type:
 - 1. Material: Stainless steel.
 - 2. Configurations shall be as shown on drawings.
 - 3. Where cap flashings or counter flashings occur, they shall be of two-piece construction with a receiver having a special vertical locking slot that requires no malleting or bending to hold the insert member in place.
 - 4. Keyed or corrugated flashings are unacceptable.
 - 5. Where flashings do not turn up behind walls, terminate with a 1/4" hook dam.
 - 6. Thru-wall flashings at parapets shall be hemmed flush with the exposed face of face brick.
 - 7. Fasteners, mastic for sealing and attachment, etc., shall be as recommended by the manufacturer.
- B. Flashing Type 2: Masonry thru-wall type:
 - 1. Stainless steel : ASTM A666 Type 304, soft temper, 0.015 inch (0.4 mm) thick; smooth No. 4 finish.
 - 2. Configurations shall be as shown on drawings.
 - 3. Installation: Refer to Section 04 20 00 - Unit Masonry.
- C. Flashing Type 2A – Masonry thru-wall type:
 - 1. Material: Stainless steel core flexible flashing with drainage fabric; with continuous stainless steel drip edge.
 - 2. Product standard of quality: York Manufacturing, Inc.; York Multi-Flash SS 304.
 - a. Substitutions: See Section 01 60 00.
 - 3. Characteristics:
 - a. Type: Stainless steel core with polymer fabric laminated to the bottom stainless steel face with non-asphalt adhesive. The top face (exposed side) must not be covered with a polymer fabric.
 - b. Stainless steel: Type 304, ASTM A240
 - 4. Fabric: polymer fabric; laminated back face (non-exposed side) of stainless steel core.
 - 5. Accessories:
 - a. Mastic/sealant: Product standard of quality is York Manufacturing, Inc.; UniverSeal US100.
 - b. Drip edges, outside corner and inside corner material: manufacturer's standard available units using 26-gauge stainless steel.

- c. End dams: Utilize pre-formed end dams by manufacturer using 26-gauge stainless steel.
 - d. Splice material: Product standard of quality is York 304 SS by York. Manufacturer's standard self-adhered metal material: material matching system material or use Multi-Flash Stainless Steel 6" lap piece and polyether sealant as a splice.
 - e. Termination bar: Product standard of quality is York T-96 termination bar. Manufacturer's standard 1" composite material bar or a 1" 26-gauge stainless steel termination bar with sealant lip.
6. Configuration shall be as shown on drawings.
 7. Installation: Refer to Section 04 20 00 – Unit Masonry
- D. Flashing Type 2B: Masonry thru-wall type.
1. Stainless Steel/Polymer Fabric Drainage Plane Flashing - Self-Adhering: ASTM A240/A240M; 2 mil (0.05 mm) type 304 stainless steel sheet with co-polymer butyl adhesive and a removable release liner on one side and a sheet of nonwoven drainage material bonded to the other side.
 - a. Manufacturers:
 - 1) York Manufacturing, Inc; Flash-Vent SA: www.yorkmfg.com/#sle.
 - 2) Substitutions: See Section 01 60 00 - Product Requirements.
 2. Configurations shall be as shown on drawings.
 3. Installation: Refer to Section 04 20 00 - Unit Masonry .
- E. Flashing Type 3: Membrane roofing base flashing material as specified in Section 07 53 00 - Elastomeric Membrane Roofing .
- F. Flashing Type 4: Formed metal flashing (Other than Type 1):
1. Material: Stainless steel.
 2. Configurations shall be as shown on drawings.
- 2.03 ACCESSORIES
- A. Fasteners: Stainless steel, with soft neoprene washers.
 - B. Outside corner and inside corner material; manufacturer's standard available units using:
 1. Stainless steel: 26 gauge stainless steel.
 - C. End dam: Utilize preformed end dams by manufacturer using:
 1. Stainless steel: 26 gauge stainless steel
 - D. Protective Backing Paint: Asphaltic mastic, ASTM D4479 Type I.
 - E. Sealant to be Concealed in Completed Work: Type 3 as specified in Section 07 92 00.
 - F. Sealant to be Exposed in Completed Work: Type 1 as specified in Section 07 92 00.
 - G. Reglets: Surface mounted type, galvanized steel; face and ends covered with plastic tape.
 - H. Termination Bars: 1 inch wide (25 mm) x 1/8 inch thick (3 mm); stainless steel.
- 2.04 FABRICATION
- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
 - B. Form pieces in longest possible lengths.
 - C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
 - D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
 - E. Fabricate vertical faces with bottom edge formed outward 3/4 inch (19 mm) and hemmed to form drip.

- F. Fabricate flashings to allow toe to extend 4 inches (101 mm) over roofing membrane. Return and brake edges.

2.05 GUTTERS AND DOWNSPOUTS

- A. See Section 07 71 23 for manufactured gutters and downspouts.

2.06 ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Primer Type: Zinc chromate.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.
- F. Solder: ASTM B32, Alloy Grade - Sn50 (50/50).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.38 mm).

3.03 INSTALLATION

- A. Conform to drawing details and to the following:
 - 1. SMACNA Architectural Sheet Metal Manual,
- B. Insert flashings into reglets to form tight fit; secure in place with plastic wedges; seal flashings into reglets with sealant.
- C. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
- D. Apply plastic cement compound between metal flashings and felt flashings.
- E. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Fasten cavity wall flashings to stud back-up with a non-corrosive termination bar and seal the top edge of the flashing with sealant.
- G. Seal metal joints watertight.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION 07 62 00

SECTION 07 71 00
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including copings and fascias.

1.02 RELATED REQUIREMENTS

- A. Section 07 53 00 - Elastomeric Membrane Roofing: Roof warranty requirements
- B. Section 07 71 23 - Manufactured Gutters and Downspouts
- C. Section 07 72 00 - Roof Accessories: Manufactured curbs and roof hatches..

1.03 REFERENCE STANDARDS

- A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2017.
- B. NRCA (RM) - The NRCA Roofing Manual; 2023.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- D. Samples for Verification: Submit two color chips, 6 by 6 inches (152 by 152 mm), illustrating component shape, finish, and color.
- E. Samples: Submit two appropriately sized samples of coping and fascia.
- F. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

1.05 WARRANTY:

- A. Provide a roofing manufacturer's full system warranty to include roof edge systems.
- B. See Section 07 53 00 for warranty requirements.
- C. Provide a 20-year warranty for painted finishes, covering color fade, chalk and film integrity.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Roof Edge Flashings and Copings:
 - 1. Hickman Edge Systems: www.hickmanedgesystems.com/#sle.
 - 2. Metal-Era Inc: www.metalera.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
 - 4. In order to meet warranty requirements of Article 1.06A, Private Label metal roof edge and coping systems by the approved manufacturers, meeting the requirements of this Section, are also acceptable.
- B. Expansion Joint Covers:
 - 1. Construction Specialties, Inc: www.c-sgroup.com/#sle.
 - 2. GAF: www.gaf.com/sle.
 - 3. Johns Manville: www.jm.com.
 - 4. MM Systems Corp: www.mmsystemscorp.com.

5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

- A. Roof Edge Flashings: Factory fabricated to sizes required; corners mitered; concealed fasteners.
1. Configuration: Fascia, and edge securement for roof membrane.
 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test methods RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable local building code.
 3. Exposed Face Height: As indicated on drawings.
 4. Material: Formed aluminum sheet, 0.050 inch (1.3 mm) thick, minimum.
 5. Finish: 70 percent polyvinylidene fluoride.
 6. Color: To be selected by Architect from manufacturer's full range.
 7. Products:
 - a. Hickman Edge Systems; TerminEdge EX Fascia:
www.hickmanedgesystems.com/#sle.
 - b. Metal-Era, Inc., Anchor-Tite Fascia: www.metalera.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Copings: Factory fabricated to sizes required; corners mitered; concealed fasteners.
1. Configuration: Concealed hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code.
 3. Wall Width: As indicated on drawings.
 4. Outside Face Height: As indicated on drawings.
 5. Inside Face Height: As indicated on drawings.
 6. Material: Formed aluminum sheet, 0.050 inch (1.3 mm) thick, minimum.
 7. Finish: 70 percent polyvinylidene fluoride.
 8. Color: To be selected by Architect from manufacturer's full range.
 9. Products:
 - a. Hickman Edge Systems; Permasnap Cantilever Coping:
www.hickmanedgesystems.com/#sle.
 - b. Metal-Era, Inc., Perma-Tite Cantilever Coping: www.metalera.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Expansion Joint Covers: Composite construction of 6 inch (152 mm) wide flexible compatible flashing of black color with closed cell urethane foam backing, each edge seamed to aluminum sheet metal flanges, designed for nominal joint width of 1 inch (25.4 mm). Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.
- D. Pipe and Penetration Flashing: Base of rounded aluminum, compatible with specified roof systems, and capable of accomodating pipes sized between 3/8 inch (9.5 mm) and 12 inch (305 mm).

2.03 ACCESSORIES

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

2.04 FINISHES

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.
- D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- E. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION 07 71 00

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SECTION 07 71 23
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-finished aluminum gutters and downspouts.
- B. Aluminum downspout shoes.
- C. Precast concrete splash pads.

1.02 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim.
- B. Section 07 71 00 - Roof Specialties : Roof fascia and copings

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on prefabricated components.
- C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
- D. Samples: Submit two samples, 12 inch (304 mm) long illustrating component design, finish, color, and configuration.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gutters and Downspouts:
 - 1. Hickman Edge Systems: www.hickmanedgesystems.com/#sle.
 - 2. Metal-Era Inc; Seal-Tite Gold Industrial Gutter: www.metalera.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Pre-Finished Aluminum Sheet: ASTM B209/B209M; 0.050 inch (1.27 mm) thick.
 - 1. Finish: Plain, shop pre-coated with polyvinylidene fluoride (PVDF) coating.
 - 2. Color: To match copings and fascia..

2.03 COMPONENTS

- A. Gutters: Profile as indicated.
- B. Downspouts: SMACNA rectangular profile.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.

- D. Fasteners: Stainless steel, with soft neoprene washers.

2.04 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.05 FINISHES

- A. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605, multiple coat, thermally cured fluoropolymer finish system; color as indicated.
- B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

2.06 ACCESSORIES

- A. Splash Pads: Precast concrete type, profiles size(s) as indicated; minimum 3,000 psi (21 MPa) compressive strength at 28 days, with minimum 5 percent air entrainment.
- B. Downspout Shoes: Smooth interior without boxed corners or choke points; include integral lug slots and internal debris grate with cleanout door.
 - 1. Configuration: Angular.
 - 2. Height: 30 inches.
 - 3. Material: Aluminum.
 - 4. Finish: Manufacturer's standard factory applied powder coat finish.
 - 5. Accessories: Manufacturer's standard stainless steel building wall anchors.
 - 6. Locations: Provide at downspout transitions to roof drainage piping. Refer to Drawings for additional information.
 - 7. Products:
 - a. Piedmont Downspout Adapters, SO Series, by Piedmont Pipe Construction, Inc.: www.piedmontpipe.com .
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

- A. Paint concealed sheet metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.381 mm).

3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Set splash pads under downspouts.

END OF SECTION 07 71 23

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof curbs.
- B. Equipment rails.
- C. Roof hatches with access ladders.

1.02 RELATED REQUIREMENTS

- A. Section 07 53 00 - Elastomeric Membrane Roofing
- B. Section 07 71 00 - Roof Specialties: Other manufactured roof specialty items.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- B. Shop Drawings: Submit dimensioned, project specific shop drawings for each type of roof-mounted item.
- C. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. Correct defective Work within a two year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 ROOF CURBS

- A. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
 - 1. Applications: Roof curbs used for roof penetrations/openings as indicated on drawings, HVAC units, duct openings, pipe penetrations, and equipment supports.
 - 2. Roof Curb Mounting Substrate: Curb substrate consists of flat roof deck sheathing with insulation.
 - 3. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 (230); G90 (Z275) coating designation; 18 gage, 0.048 inch (1.21 mm) thick.

- a. Color: As selected by Architect from manufacturer's standard line of colors.
 - B. Curbs Adjacent to Roof Openings: Provide curb on each side of opening, with top of curb horizontal for equipment mounting.
 1. Provide preservative treated wood nailers along top of curb.
 2. Insulate inside curbs with 1-1/2 inch (38 mm) thick fiberglass insulation.
 3. Height Above Finished Roof Surface: 12 inches (304 mm), minimum.
- 2.02 ROOF HATCHES AND VENTS, MANUAL AND AUTOMATIC OPERATION
- A. Roof Hatch Manufacturers:
 1. Activar Construction Products Group, Inc. - JL Industries; Diamond Series Roof Hatches, Model ____: www.activarcpg.com/#sle.
 2. Babcock-Davis; ThermalMAX: www.babcockdavis.com/#sle.
 3. Best Access Doors; Series BA-GRH - Ladder Access Roof Hatch, Galvanized: www.bestaccessdoors.com/#sle.
 4. Bilco Company: www.bilco.com/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
 - B. Roof Hatches: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
 1. Style: Provide flat metal covers unless otherwise indicated.
 2. Mounting Substrate: Provide frames and curbs suitable for mounting on flat roof deck sheathing with insulation.
 3. Thermally Broken Hatches: Provide insulation within frame and cover.
 4. For Ladder Access: Single leaf; 36 by 36 inches (914 by 914 mm).
 5. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 - a. Material: Mill finished aluminum, 11 gage, 0.0907 inch (2.3 mm) thick.
 - b. Insulation: Manufacturer's standard; 3 inch (76 mm) rigid polyisocyanurate, located on outside face of curb.
 - c. Curb Height: 12 inches (___ mm) from finished surface of roof, minimum.
 6. Metal Covers: Flush, insulated, hollow metal construction.
 - a. Capable of supporting 40 psf (1.92 kPa) live load.
 - b. Material: Mill finished aluminum; outer cover 11 gage, 0.0907 inch (2.3 mm) thick, liner 0.04 inch (1.0 mm) thick.
 - c. Insulation: Manufacturer's standard 3 inch (76 mm) rigid polyisocyanurate.
 - d. Gasket: Neoprene, continuous around cover perimeter.
 - C. Safety Railing System (Roof Hatches): Manufacturer's standard accessory safety rail system mounted directly to curb.
 1. Posts and Rails: Aluminum tube.
 2. Gate: Same material as railing; automatic closing with latch.
 3. Finish: Manufacturer's standard, factory applied finish.
 4. Fasteners: Stainless steel, Type 316.
 5. Products:
 - a. BILCO Company; Bil-Guard 2.0: www.bilco.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - D. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf (475 kPa) load.

2. Hinges: Manufacturer's standard piano hinge.
3. Hold open arm with manual release.
4. Latch: Upon closing, engage latch automatically and reset manual release.
5. Manual Release: Pull handle on interior and exterior.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07 72 00

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SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 07 05 53 - Fire and Smoke Assembly Identification.
- B. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.
- C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).
- D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2020a.
- E. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2020a.
- F. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2023a.
- G. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2023.
- H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- I. ITS (DIR) - Directory of Listed Products; Current Edition.
- J. FM (AG) - FM Approval Guide; Current Edition.
- K. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- L. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- M. UL (DIR) - Online Certifications Directory; Current Edition.
- N. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD) or FM (AG) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Trained by manufacturer.
 - 2. Verification of minimum three years documented experience installing work of this type.

1.06 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com/firestop.
 - 2. Hilti, Inc: www.hilti.com/#sle.
 - 3. Nelson FireStop Products: www.nelsonfirestop.com.
 - 4. Specified Technologies Inc: www.stifirestop.com/#sle.
 - 5. International Fireproof Technology, Inc. ; www.painttoprotect.com/.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- D. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. General:
 - 1. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
 - 2. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- B. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.

1. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.
 - C. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
 1. Movement: Provide systems that have been tested to show movement capability as indicated.
 - D. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
 1. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
 - E. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 1. Temperature Rise: Where penetration is not contained in a wall cavity, provide systems that have been tested to show T Rating equal to F Rating, where required by code.
 2. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- 2.04 FIRESTOPPING SYSTEMS
- A. Firestopping: Any material meeting requirements.
 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 COORDINATION

- A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.

- D. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

3.04 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

3.05 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 and ASTM E2393.
- B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.06 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.07 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07 84 00

DIVISION 07 SECTION 07 84 13
FIRE PROTECTION, HVAC & PLUMBING PENETRATION FIRESTOPPING
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END OF SECTION 9

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SECTION 07 84 13
FIRE PROTECTION, HVAC & PLUMBING PENETRATION FIRESTOPPING

PART 1 GENERAL

1.1. SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section includes:
 - 1. Through-penetration firestopping in fire rated construction.
 - 2. Through-penetration smoke-stopping in smoke partitions.
- C. Related items:
 - 1. Fire dampers and manufactured devices: Refer to Division 23 Section HVAC Air Distribution.

1.2. REFERENCES

- A. Underwriters Laboratories
 - 1. UL Fire Resistance Directory
 - a. Through-penetration firestop devices (XHCR)
 - b. Fire resistance rating (BXUV)
 - c. Through-penetration firestop systems (XHEZ)
 - d. Fill, void, or cavity material (XHHW)
- B. American Society for Testing and Materials Standards:
- C. ASTM E 814-88: Standard Test Method for Fire Tests of Through-Penetration Firestops.

1.3. DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
- B. Barriers: Time-rated fire walls, smoke barrier walls, time-rated ceiling/floor assemblies and structural floors.
- C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.
- D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
- E. System: Specific products and applications, classified and numbered by Underwriters

Laboratories, Inc. to close specific barrier penetrations.

- F. Sleeve: Metal fabrication or pipe section extended through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.4. SYSTEM DESCRIPTION

A. Design Requirements

1. Fire-rated construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations.
2. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations.

1.5. SUBMITTALS

- A. Submit in accordance with Division 01 Section Submittal Procedures, unless otherwise indicated.

- B. Product data: Manufacturer's specifications and technical data including the following:

1. Detailed specification of construction and fabrication.
2. Manufacturer's installation instructions.

- C. Shop drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.

1. Details of each proposed assembly identifying intended products and applicable UL system number, or UL classified devices.
2. Manufacturer or manufacturer's representative shall provide qualified engineering judgment and drawings relating to non-standard applications as needed.

- D. Quality control submittals:

1. Statement of qualifications.

- E. Applicators' qualifications statement:

1. List past projects indicating required experience.

1.6. QUALITY ASSURANCE

- A. Installer's qualifications: Fire experienced in installation or application of systems similar in complexity to those required for this project, plus the following:

1. Acceptable to or licensed by manufacturer, State or local authority where

applicable.

2. At least 2 years experience with systems.
 3. Successfully completed at least 5 comparable scale projects using this system.
- B. Local and State regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.
- C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

1.7. DELIVERY, STORAGE, AND HANDLING

- A. Packing and shipping:
1. Deliver products in original unopened packaging with legible manufacturer's identification.
 2. Coordinate delivery with scheduled installation date, allow minimum storage at site.
- B. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.8. PROJECT CONDITIONS

- A. Existing condition:
1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
 2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.
- B. Environmental requirements:
1. Furnish adequate ventilation if using solvent.
 2. Furnish forced air ventilation during installation if required by manufacturer.
 3. Keep flammable materials away from sparks or flame.
 4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.

1.9. WARRANTY

- A. Submit copies of written warranty agreeing to repair or replace joint sealers which fail in joint adhesion, extrusion resistance, migration resistance, or general durability or appear to

deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The warranty period shall be two (2) years from date of substantial completion unless otherwise noted.

PART 2 PRODUCTS

2.1. THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

- A. Systems of devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos-free.
 - 1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.
 - 2. Acceptable manufacturers and products.
 - a. Those listed in the UL Fire Resistance directory for the UL System involved and as further defined in the System and Applications Schedule in Part 3.6 of this section.
 - 3. All firestopping products must be from a single manufacturer. All trades shall use products from the same manufacturer unless otherwise noted.

2.2. SMOKE-STOPPING AT SMOKE PARTITIONS

- A. Through-penetration smoke-stopping: Any system complying with the requirements for through-penetration firestopping in fire-rated construction, as specified in The Systems and Applications Schedule in Part 3.6 of this section, is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

2.3. ACCESSORIES

- A. Fill, void or cavity materials: As classified under category XHHW in the UL Fire Resistance Directory.
- B. Forming materials: As classified under category XHKU in the UL Fire Resistance Directory.

PART 3 EXECUTION

3.1. EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify barrier penetrations are properly sized and in suitable condition for application of materials.

2. Do not proceed until unsatisfactory conditions have been corrected.

B. Coordinate an inspection of all Mechanical Firestopping systems with the Fire Marshal prior to installation of ceilings, walls, etc.

3.2. PREPARATION

A. Clean surfaces to be in contact with penetration seal materials of dirt, grease, oil, loose materials, rust, or other substances that may affect proper fitting, adhesion, or the required fire resistance.

3.3. INSTALLATION

A. Install penetration seal materials in accordance with printed instructions of the UL Fire Resistance Directory and in accordance with manufacturer's instruction.

B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

C. Protect materials from damage on surfaces subject to traffic.

D. When large openings are created in walls or floors to permit installation of pipes, ducts, or other items, close unused portions of opening with firestopping materials tested for the application. See UL Fire Resistance Directory or Section 3.6 of this document.

1. Install smoke stopping as specified for firestopping.

3.4. FIELD QUALITY CONTROL

A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Perform under this section patching and repairing of firestopping caused by cutting or penetration by other trades.

3.5. ADJUSTING AND CLEANING

A. Clean up spills of liquid components.

B. Neatly cut and trim materials as required.

C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

3.6. SYSTEMS AND APPLICATION SCHEDULES*

PENETRATING ITEM	CONCRETE	GYPSUM	WOOD FLOOR/CEILING
Metal Pipe	CAJ1001 CP25S/L, CP25N/S CAJ1006 CS-195+, FS-195+ CAJ1007 FS-195+, 1-inch& 2-inch Wide CAJ1009 2000, 2000+, 2003 CAJ1010 2000, 2000+, 2003 CAJ1012 2000, 2000+, 2003 CAJ1013 2000, 2000+, 2003 CAJ1014 2000, 2000+, 2003 CAJ1015 2000, 2000+, 2003 CAJ1017 FD 150 CAJ1021 FD 150 CAJ1027 MPS-2+ CAJ1044 CP 25WB+ CAJ1052 CP 25S/L, CP 25N/S CAJ1058 2000, 2000+, 2003 CAJ1060 2000, 2000+, 2003 CAJ1063 2000, 2000+, 2003 CAJ1066 CP 25N/S,CP 25S/L, CP 25WB+ CAJ1091 CP 25N/S,CP 25S/L, CP 25WB+ CAJ1092 CP 25WB+ CAJ1112 FS-195+ CAJ1160 CP 25S/L, CP 25N/S CAJ1175 CP 25WB+ CAJ1176 CP 25WB+ CAJ1188 2000+ CBJ1020 CS-195+, FS-195+ CBJ1021 CS-195+, MPS-2+ CBJ1031 2001 CBJ1032 2001 FA1002 CP 25WB+ WJ1010 CP25WB+ WJ1023 2001	WL1001 CP 25 WL1002 FS-195+ WL1003 CP 25WB+,CP 25N/S WL1008 2000+ WL1009 2000+ WL1010 2000+ WL1016 CP 25WB+ WL1017 CP 25WB+,CP 25N/S WL1032 CP 25WB+,CP 25N/S WL1036 FD 150 WL1037 CS-195+,FS-195+ WL1067 CP 25N/S WL1073 CP 25WB+ WL1080 MPS2+ WL1082 2000+	FC1002 CP 25 FC1003 2000,2000+,20003 FC1006 CP 25WB+
Non-Metallic	CAJ2001 FS-195+, 1-inch& 2-inch WIDE, PPD'S CAJ2002 FS-195+ CAJ2003 CS-195+, FS-195+ CAJ2005 FS-195 CAJ2006 FS-195+ CAJ2013 FS-195+ CAJ2019 2000, 2000+, 2003 CAJ2027 FS-195+, CP 25N/S, CP 25S/L, CP 25WB+ CAJ2028 FS-195, MPS-2+ CAJ2029 FS-195+, PPD'S CAJ2030 CS-195+, FS-195+ CAJ2040 FS-195+, CP 25WB+ CAJ2044 FS-195+, CP 25N/S, CP 25S/L CP 25 WB+ CAJ2090 FS-195+ CAJ2177 FS-195+, PPD'S FA2001 FS-195+, PPD'S FS2002 CS-195+, FS-195+, MPS-2+, PPD'S FA2011 FS-195+ WJ2012 FS-195+ 1-inch WIDE	WL2002 FS-195+, PPD'S WL2003 FS-195+ WL2004 FS-195+ WL2005 FS-195+ 4' WIDE WL2006 FS-195+ WL2013 FS-195+ WL2031 CS-195+, FS-195+ WL2032 CS-195+, FS-195+ WL2033 FS-195+ WL2073 FS-195+ 1-inch WIDE	FC2002 FS-195+, PPD'S FC2007 FS-195+, PPD'S FC2008 FS-195+ FC2009 FS-195+, PPD'S FC2024 FS-195 FC2026 FS-195+ FC2028 FS-195, 1' & 2-inch WIDE, PPD'S

NEW CASTLE COUNTY VOCATIONAL –
TECHNICAL SCHOOL DISTRICT

PAUL M. HODGSON VOCATIONAL
TECHNICAL HIGH SCHOOL

PENETRATING ITEM	CONCRETE	GYPSUM	WOOD FLOOR/CEILING
Insulated Metallic Pipe	CAJ5001 CP 25N/S, CP 25S/L, CP 25WB+ CAJ5002 FS-195+ CAJ5003 FS-195+ CAJ5005 MPS-2+ CAJ5009 2000+, 2003 CAJ5017 FS-195+, CP 25 CAJ5022 FS-195+ CAJ5024 FS-195+ CAJ5030 CS-195+, FS-195+ CAJ5041 2000, 2000+, 2003 CAJ5060 CP 25WB+ CAJ5074 2000+ CBJ5002 CP 25 CBJ5003 FS-195+ FA5001 FS-195+, CP 25WB+	WL5001 FS-195+ WL5002 FS-195+ WL5009 FS-195+ WL5010 FS-195+ WL5011 CP 25WB+ WL5032 2000+ WL5038 CP 25WB+ WL5039 CP 25WB+ WL5040 CP 25WB+ WL5045 CP 25WB+ WL5053 2000+	FC5002 FS-195+ FC5008 FS-195+
Miscellaneous Mechanical HVAC Ducts	CAJ7001 CP 25N/S CP 25S/L CAJ7003 CP 25WB+ CAJ7009 DUCT WRAP, BULK PUTTY		FC7001 CP 25S/L, CP 25N/S
Mixed Penetrating Items Combos	CAJ8001 CS-195+ FS-195 CAJ8003 2000, 2000+, 20003 CAJ8004 2000, 2000+, 20003 CAJ8006 2001 CAJ8013 FS-195+, CP 25 CBJ8004 CS-195, FS-195+ CBJ8005 CS-195+, MPS-2+ CBJ8008 2001 FA8001 FS-195+, CP 25WB+	WL8002 CS-195+, FS-195+	

*Underwriter's Laboratories, Inc., Fire Resistance Directory.

END OF SECTION

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SECTION 07 91 00
PREFORMED JOINT SEALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Precompressed foam seals.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Liquid and mastic joint sealants and their backing materials.

1.03 REFERENCE STANDARDS

- A. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.
- B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).
- C. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements; 1991 (Reapproved 2011).
- D. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's technical data sheets for each product, including chemical composition, movement capability, color availability, limitations on application, and installation instructions.
- C. Color Cards: For color selection.
- D. Samples for Color Selection: 4 inch (102 mm) long pieces of each color available; at least 2 samples of each color.
- E. Volatile Organic Content (VOC) Documentation: For adhesives and primers, submit VOC content and emissions documentation as specified in Section 01 61 16.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section with at least three years of documented experience.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a two year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealers that fail to achieve watertight seal or exhibit loss of adhesion or cohesion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Precompressed Foam Seals:

Preformed Joint Seals

Bid Pack E - Fieldhouse, Athletic Fields & Storage Buildings

07 91 00 - 1

ISSUED FOR BIDS 11/04/25

1. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
2. Sika Corporation: www.usa-sika.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PRECOMPRESSED FOAM SEALS

- A. Precompressed Foam Seal: Comprised of urethane, modified-acrylic impregnated, open-cell polyurethane, or closed-cell neoprene foam impregnated with water-repellent, and with self-adhesive faces protected prior to installation by release paper.
1. Color: As selected by Architect.
 2. Size as required to provide weathertight seal when installed.
 3. Applications:
 - a. Exterior wall expansion joints.
 4. Products:
 - a. EMSEAL Joint Systems, Ltd; DSM System: www.emseal.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

- A. Adhesive: As recommended by seal manufacturer.
- B. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and strip seal.
- C. Substrate Cleaner: Non-corrosive, non-staining type recommended by seal manufacturer; compatible with joint forming materials.
- D. Primer: Type recommended by seal manufacturer to suit application; non-staining.
- E. Backing Tape: Self-adhesive polyethylene tape with surface that seal will not adhere to.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive this work.
- B. Measure joint dimensions and verify that seal products are of the correct size to properly seal the joints.

3.02 PREPARATION

- A. Properly prepare construction components adjacent to the work of this section to prevent damage and disfigurement due to this work.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Precompressed Foam Seals:
1. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.
 2. Prepare joints and install seals in accordance with manufacturer's written recommendations.
 3. Remove loose materials and foreign matter that could impair adhesion of sealant.
 4. Do not stretch precompressed seal; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch (3 to 6 mm) below adjoining surface.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect joints from damage until adhesives have properly cured.

END OF SECTION 07 91 00

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SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 13 00 - Sheet Waterproofing: Sealing cracks and joints in waterproofing substrate surfaces using materials specified in this section.
- B. Section 07 25 00 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- C. Section 07 84 00 - Firestopping: Firestopping sealants.
- D. Section 07 95 13 - Expansion Joint Cover Assemblies: Sealants forming part of expansion joint cover assemblies.
- E. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
- F. Section 08 80 00 - Glazing: Glazing sealants and accessories.
- G. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
- H. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 SUBMITTALS

- A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- E. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
- F. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

- G. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
- H. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- D. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
 - 1. Identification of testing agency.
 - 2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Test date.
 - b. Copy of test method documents.
 - c. Age of sealant upon date of testing.
 - d. Test results, modeled after the sample form in the test method document.
 - e. Indicate use of photographic record of test.
- E. Field Quality Control Plan:
 - 1. Visual inspection of entire length of sealant joints.
 - 2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
 - 3. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
 - a. For each different sealant and substrate combination, allow for one test every 100 feet (30 meters) in the first 1000 linear feet (305 linear meters), and one test per 1000 linear feet (305 meters) thereafter, or once per floor on each elevation.
 - b. If any failures occur in the first 1000 linear feet (305 linear meters), continue testing at frequency of one test per 500 linear feet (152 linear meters) at no extra cost to Owner.
 - 4. Field testing agency's qualifications.
 - 5. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- F. Field Adhesion Test Procedures:
 - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 - 2. Have a copy of the test method document available during tests.
 - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 - 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.

5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- G. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
- H. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
 1. Sample: At least 18 inch (457 mm) long.
 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch (25 mm) by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
 3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

1.05 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Joints between plumbing fixtures and adjacent construction.
 3. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 4. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.

- B. Exterior Joints: Use non-sag non-staining silicone sealant, Type 1, unless otherwise indicated.
 - 1. Type 3 - Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
- C. Interior Joints: Use non-sag acrylic latex sealant, Type 2, unless otherwise indicated.
 - 1. Interior Expansion and Control Joints: Polyurethane sealant; Type 1A.
 - 2. Interior Joints at windows, storefront and curtainwall: Polyurethane sealant; Type 1A.
 - 3. Fire-rated Construction: ASTM C 834, UL Listed.
 - 4. In Sound-Rated Assemblies: Acoustical sealant; Type 5.
 - 5. Type 7 - Narrow Control Joints in Interior Concrete Slabs Exposed to View: Self-leveling polyurea sealant.
 - 6. Interior Wet Areas: Type 6 - Mildew-Resistant Silicone Sealant: not expected to withstand continuous water immersion or traffic. Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

2.02 JOINT SEALANTS - GENERAL

A. Sealant Types Summary:

- 1. Type 1: Non-Staining Silicone.
- 2. Type 1A: Polyurethane.
- 3. Type 2: Acrylic Emulsion Latex
- 4. Type 3: Non-Curing Butyl Sealant
- 5. Type 4: Fire resistant foam sealant: Refer to Section 078400 - Firestopping.
- 6. Type 5: Acoustical Sealant
- 7. Type 6: Mildew-Resistant Silicone Sealant
- 8. Type 7: Self-Leveling Polurea Sealant

2.03 NONSAG JOINT SEALANTS

- A. Type 1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
 - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 4. Color: To be selected by Architect from manufacturer's standard range.
 - 5. Cure Type: Single-component, neutral moisture curing.
 - 6. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
 - 7. Manufacturers:
 - a. Dow Chemical Company; 795 Silicone Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - b. Sika Corporation; Sikasil WS-295: www.usa-sika.com/#sle.
 - c. Pecora Corporation; 890NST: www.pecora.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type 1A - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: To be selected by Architect from manufacturer's standard range.
 - 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 - 5. Manufacturers:
 - a. Pecora Corporation; DynaTrol 1-XL: www.pecora.com.
 - b. Sika Corporation; Sikaflex-15 LM: www.usa-sika.com/#sle.

- c. Tremco Commercial Sealants & Waterproofing; Dymonic 100:
www.tremcosealants.com/#sle.
- d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Type 2 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
- D. Type 3 - Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.
- E. Type 4: Fire resistant foam sealant: Refer to Section 07 84 00 - Firestopping.
- F. Type 5 - Acoustical Sealant for Concealed Locations: ASTM C 834, UL Listed.
 - 1. Composition: Acrylic latex emulsion sealant.
 - 2. Applications: Use for concealed locations only:
 - a. Acoustical application: Sealant bead between top stud runner and structure and between bottom stud track and floor.
 - 3. Products:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant:
www.pecora.com.
 - b. Hilti, Inc.; CP 506 Smoke and Acoustical Sealant: www.us.hilti.com.
 - c. USG Company; Sheetrock Brand Acoustical Sealant; www.usg.com.
- G. Type 6 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: White.
 - 2. Manufacturers:
 - a. Pecora Corporation: www.pecora.com.
 - b. Sika Corporation; Sikasil GP: www.usa-sika.com.

2.04 SELF-LEVELING SEALANTS

- A. Type 7 - Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
 - 1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
 - 2. Color: To be selected by Architect from manufacturer's standard colors.
 - 3. Joint Width, Minimum: 1/8 inch (3 mm).
 - 4. Joint Width, Maximum: 3/4 inch (19 mm).
 - 5. Joint Depth: Provide product suitable for joints from 1/8 inch (3 mm) to 1 inch (25.4 mm) in depth excluding space for backer rod.
 - 6. Manufacturers:
 - a. Adhesives Technology Corporation; Crackbond JF-311: www.atcepoxy.com/#sle.
 - b. ARDEX Engineered Cements; ARDEX ARDISEAL RAPID PLUS:
www.ardexamericas.com/#sle.
 - c. Euclid Chemical Company; EUCO QWIKjoint UVR:
www.euclidchemical.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 - 2. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
 - 3. Manufacturers:
 - a. Nomaco, Inc; SOF Rod: www.nomaco.com.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 - 2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.
 - 3. Record each test on Preinstallation Adhesion Test Log as indicated.
 - 4. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
 - 5. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
 - 1. Width/depth ratio of 2:1.

2. Neck dimension no greater than 1/3 of the joint width.
 3. Surface bond area on each side not less than 75 percent of joint width.
 - E. Install bond breaker backing tape where backer rod cannot be used.
 - F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
 - G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
 - H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
 - I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.
- 3.04 FIELD QUALITY CONTROL
- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
 - B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Architect immediately.
 - C. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet (300 linear m), notify Architect immediately.
 - D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
 - E. Repair destructive test location damage immediately after evaluation and recording of results.
- 3.05 POST-OCCUPANCY
- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION 07 92 00

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SECTION 08 11 13 - 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. 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. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 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. 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.

1.4 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.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 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.

1.7 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:
- B. Where manufacturers and products are noted as “Basis of Design” products by other manufacturers meeting the basis of design specification and design intent may be provided including, but not limited to:
 - 1. CECO Door Products (C).
 - 2. Curries Company (CU).
 - 3. Steelcraft (S).

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 (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.
 - 1. Design: Flush panel. Basis of Design Curries 707 series
 - a. Core Construction: Foamed in place polystyrene and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 “Laminated Core”.
 - b. Provide 22-gauge steel stiffeners at 6 inches on-center internally welded at 5" on-center to integral core assembly, Fully bonded polystyrene core
 - c. Thermal properties to rate at a fully operable minimum U-Factor 0.37 and R-Value 2.7, including insulated door, thermal-break frame and threshold.
 - 2. 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.

3. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 4. 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.
 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
 6. 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. Basis of Design Curries 777 Trio E series
 - a. Fiberglass core
 - b. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
 - c. 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.
 - d. 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.
 - e. 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. Curries Company (CU) - Polystyrene Core - 707 Series.
 2. Curries Company (CU) - Energy Efficient - 777 Trio-E Series.

2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- C. 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) – Thermal Break Mercury 3 thermal break
- D. 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.
- 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.
 - a. Locations: Fieldhouse, Nuilding E1, E2, E3, E6, and E7
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
 - a. Locations: Building E4 and E5
- 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 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.

2.7 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.

2.8 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. 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. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 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. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
 - 6. 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.

7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
 8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 9. 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 o.c. 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.
 10. 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".
- 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.

2.9 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.

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.
- 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

SECTION 08 31 00 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling access door and frame units.

1.02 RELATED REQUIREMENTS

- A. Section 09 90 00 - Painting: Field paint finish.

1.03 REFERENCE STANDARDS

- A. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Manufacturer's Installation Instructions: Indicate installation requirements.
- D. Project Record Documents: Record actual locations of each access unit.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall-Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Material: Steel.
 - 3. Size: 24 inch by 24 inch, unless otherwise noted.
 - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
 - 6. Tile Mounting Criteria: Provide surface-mounted frame with door surface recessed for infill with wall finish.
 - 7. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.
- B. Wall-Mounted Units in Wet Areas:
 - 1. Location: As indicated on drawings.
 - 2. Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
 - 3. Size: 24 inch by 24 inch, unless otherwise noted.
 - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
 - 6. Tile Mounting Criteria: Provide surface-mounted frame with door surface recessed for infill with wall finish.
 - 7. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.
- C. Fire-Rated Wall-Mounted Units:
 - 1. Wall Fire-Rating: As indicated on drawings.

2. Size: 24 by 24 inches, unless otherwise noted.
3. Door/Panel: Insulated double-surface panel, with tool-operated spring or cam lock and no handle.

2.02 WALL AND CEILING MOUNTED UNITS

A. Manufacturers:

1. ACUDOR Products Inc: www.acudor.com/#sle.
2. Babcock-Davis: www.babcockdavis.com/#sle.
3. Bauco Access Panel Solutions Inc: www.accesspanelsolutions.com/#sle.
 - a. Concealed Hardware and Gypsum Board Inlay: Bauco Plus II - Access Panels.
4. Karp Associates, Inc: www.karpinc.com/#sle.
5. Milcor, Inc: www.milcorinc.com.
6. Nystrom, Inc: www.nystrom.com/#sle.
7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.

1. Style: Exposed frame with door surface flush with frame surface.
 - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
2. Door Style: Single thickness with rolled or turned in edges.
3. Frames: 16 gage, 0.0598 inch, minimum thickness.
4. Single Steel Sheet Door Panels: 1/16 inch, minimum thickness.
5. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
 - a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for purpose indicated.
 - b. Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated doors.
6. Steel Finish: Primed.
7. Primed and Factory Finish: Polyester powder coat; color as selected by Architect from manufacturer's standard colors.
8. Hardware:
 - a. Hardware for Fire-Rated Units: As required for listing.
 - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 08 33 00
ROLLING SERVICE DOORS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test; 2005 (Reapproved 2011).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- C. ISO 9001 - Quality Management Systems-Requirements; 2008.
- D. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.02 SECTION INCLUDE

- A. Manual overhead rolling doors.
- B. Electric operated insulated overhead rolling doors.
- C. Electric operated insulated rolling counter doors.

1.03 RELATED SECTIONS:

- A. 05 50 00 Metal Fabrications. Door opening jamb and head members
- B. 06 10 00 Rough Carpentry. Door opening jamb and head members
- C. 08 70 00 Hardware. Padlocks. Masterkeyed cylinder
- D. Division 26. Electrical wiring and conduit, fuses, disconnect switches, connection of operator to power supply, and installation of control station and wiring

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
- B. Wind Loading: Doors to withstand design wind load – see drawings

1.05 CYCLE LIFE:

- A. a. Standard construction for normal use of up to 20 cycles per day maximum, and a life cycle expectancy of up to 50,000

1.06 SUBMITTALS

- A. Reference Section 01 33 00 Submittal Procedures; submit the following items:
- B. Product Data
- C. Shop Drawings
- D. Quality Assurance/Control Submittals:
 - 1. Provide proof of manufacturer ISO 9001:2015 registration
 - 2. Provide proof of manufacturer and installer qualifications
 - 3. Provide manufacturer's installation instructions
- E. If it is not the specified product, supply certificate of compliance to specification
- F. Closeout Submittals:
 - 1. Operation and Maintenance Manual
 - 2. Document stating that installed materials comply with this specification
 - 3. Warranty documentation

1.07 QUALITY ASSURANCE

- A. Qualifications:

1. Manufacturer Qualifications: ISO 9001:2015 registered and a minimum of five years' experience in producing doors of the type specified
2. Installer Qualifications: Manufacturer's approval

1.08 DELIVERY STORAGE AND HANDLING

- A. Reference Section 01 66 00 Product Storage and Handling Requirements
- B. Follow manufacturer's instructions

1.09 WARRANTY

- A. Standard Warranty: Two years from date of shipment against defects in material and workmanship.
- B. BMaintenance: Submit for owner's consideration and acceptance of a maintenance service agreement for installed products.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Cornell: 24 Elmwood Avenue, Mountain Top, PA 18707. Telephone: (800) 233-8366.
- B. Cookson
- C. Clopay Building Products
- D. Substitutions: See Section 01 60 00-Product Requirements.

2.02 MANUAL OVERHEAD ROLLING DOORS:.

- A. Basis of Design: Cornell Model- ESD10
- B. Material:
 1. Slats: Galvanized Steel: No. 5F, Grade 40 steel, ASTM A 653 galvanized steel zinc coating. Gauge as required to meet performance requirements.
 2. Finish: Powder Coat
 - a. Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils 0 inch (0.06 mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 3. Endlocks:
 - a. alternate slats each secured with two ¼" 0.25 inch (6.35 mm) rivets. Fabricate interlocking sections with high strength.
 - b. Provide endlocks/windlocks as required to meet specified wind load.
 4. Bottom Bar
 - a. Configuration: Structural Steel Angles
 - b. Finish: Powder Coat
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils 0 inch (0.06 mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 - 2) Color: to be selected from manufacturer's full color range
 5. Guides
 - a. Fabrication: Structural steel angles. Provide windlock bars as required, removable bellmouths, and bottom bar stoppers of same material.
 - b. Finish: Powder Coat
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils [0] inch ([0.06] mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 - 2) Color: to be selected from manufacturer's full color range
 6. Counterbalance Shaft Assembly:

- a. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of [0.03] inches ([0.76] mm) per foot ([0.1] inch ([2.5] mm) per meter) of width.
- b. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. (110 N). Provide wheel for applying and adjusting spring torque.
7. Brackets:
 - a. Fabricate from minimum [3/16] inch ([4.76] mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures
 - b. Finish: Powder Coat
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils [0] inch ([0.06] mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 - 2) Color: to be selected from manufacturer's full color range
8. Hood:
 - a. Galvanized steel with reinforced top and bottom edges. Provide intermediate support brackets as required.
 - b. Finish: Powder Coat
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils [0] inch ([0.06] mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 - 2) Color: to be selected from manufacturer's full color range
9. Weatherstripping:
 - a. Bottom Bar: Replaceable, bulb-style, compressible EDPM gasket extending into guides
 - b. Guides: Vinyl strip sealing against fascia side of curtain
 - c. Hood: Neoprene/rayon baffle to impede air flow above coil
 - d. Lintel Seal: Nylon brush seal fitted at door header to impede air flow
10. Rapid Response:
 - a. Curtain Configuration:
 - 1) 3 feet (91.44 cm) of extra curtain material
 - b. **Guide Configuration:** 56" removable lower guide section for quick access to curtain for Repairs
 - c. Impactable Bottom Bar: 2 structural steel angles with flexible connecting members
11. Operation:
 - a. **Manual ControlGard Chain Hoist:** Provide chain hoist operator with endless steel chain, chain pocket wheel and guard, geared reduction unit, and chain keeper secured to guide. Chain hoist to include integral brake mechanism that will immediately stop upward or downward travel and maintain the door in a stationary position when the hand chain is released by the user.
12. Accessors.
 - a. Locking:
 - 1) Master keyable cylinder operable from both sides of opening, options for all types of operation. Provide interlock switches or motor mounted interlock switches.

2.03 ELECTRIC OPERATED INSULATED OVERHEAD ROLLING DOORS.

- A. Basis of Design: Cornell Model- ESD20
- B. Material

1. Slats: Galvanized Steel: No. 5F, Grade 40 steel, ASTM A 653 galvanized steel zinc coating. Gauge as required to meet performance requirements.
 - a. Finish: Powder Coat
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils 0 inch (0.06 mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 - 2) Color: to be selected from manufacturer's full color range
 - b. Insulation: 7/8 inch (22.22 mm) foamed-in-place, closed cell urethane
 - c. Total Slat Thickness: 15/16 inch (23.81 mm)
 - d. Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84
 - e. R-value: 8.0
2. Endlocks:
 - a. Alternate slats each secured with two ¼" (6.35 mm) rivets. Fabricate interlocking sections with high strength.
 - b. Provide endlocks/windlocks as required to meet specified wind load.
3. Bottom Bar
 - a. Configuration: Structural Steel Angles
 - b. Finish: Powder Coat
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils [0] inch ([0.06] mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 - 2) Color: to be selected from manufacturer's full color range
4. Guides
 - a. Minimum 3/16 inch (4.76 mm) structural steel angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar. Top 16 ½" (419.1 mm) of coil side guide angles to be removable for ease of curtain installation and as needed for future curtain service.
 - b. Finish: Powder Coat
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils 0 inch (0.06 mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 - c. Color: to be selected from manufacturer's full color range
5. Counterbalance Shaft Assembly:
 - a. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches (0.76 mm) per foot (0.1 inch (2.5 mm) per meter) of width
 - b. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. (110 N). Provide wheel for applying and adjusting spring torque
6. Brackets:
 - a. Fabricate from minimum 3/16 inch (4.76 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures
 - b. Finish: Powder Coat:
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils 0 inch (0.06 mm) cured film thickness; ASTM D3363 pencil hardness: H or better.
 - 2) Color: to be selected from manufacturer's full color range

7. Hood:
 - a. Galvanized steel with reinforced top and bottom edges. Provide intermediate support brackets as required.
 - b. Finish: Powder Coat:
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils 0 inch (0.06 mm) cured film thickness; ASTM D3363 pencil hardness: H or better.
 - 2) Color: to be selected from manufacturer's full color range
8. Weatherstripping:
 - a. Bottom Bar: Replaceable, bulb-style, compressible EDPM gasket extending into guides
 - b. Guides: Vinyl strip sealing against fascia side of curtain
 - c. Hood: Neoprene/rayon baffle to impede air flow above coil
 - d. Lintel Seal: Nylon brush seal fitted at door header to impede air flow
9. Rapid Response:
 - a. Curtain Configuration:
 - 1) 3 feet (91.44 cm) of extra curtain material
 - b. Guide Configuration: 56" removable lower guide section for quick access to curtain for Repairs
 - c. Impactable Bottom Bar: 2 structural steel angles with flexible connecting members
10. Operation
 - a. Motor – Standard Use – Model MG (Industrial Duty Gear Head) Operator: The operator must not extend above or below the door coil when mounted front-of-coil. Rated for a maximum of 20 cycles per hour (not to be used for consecutive hours) cULus listed (to comply with UL requirements in The United States and Canada), Totally Enclosed Non Ventilated gear head operator(s) rated 1/2 hp as recommended by door manufacture for size and type of door, 120 Volts, single Phase. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, emergency manual chain hoist and control station(s). Motor shall be high starting torque, industrial type, protected against overload with an auto-reset thermal sensing device. Primary speed reduction shall be heavy-duty, lubricated gears with mechanical braking to hold the door in any position. Operator shall be equipped with an emergency manual chain hoist assembly that safely cuts operator power when engaged. A disconnect chain shall not be required to engage or release the manual chain hoist Operator drive and door driven sprockets shall be provided with #50 roller chain. Provide an integral Motor Mounted Interlock system to prevent damage to door and operator when mechanical door locking devices are provided. Operator shall be capable of driving the door at a speed of up to 9" per second or as recommended for door size. Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.
 - b. Control Station:
 - 1) Surface mounted: "Open/Close" key switch with "Stop" push button; NEMA 3R
 - c. Control Operation:
 - 1) Constant Pressure to Close:
 - (a) 2-wire, electric sensing edge seal extending full width of door bottom bar. Contact before door fully closes shall cause door to immediately stop

downward travel and reverse direction to the fully opened position. Provide a retracting safety cord and reel connection to control circuit.

- d. Momentary Contact to Close: Fail-safe, UL 325-2010 Compliant Entrapment Protection for Motor Operation.
- e. Sensing / Weather Edge: Automatic reversing control by an automatic sensing switch within neoprene or rubber astragal extending full width of door bottom bar.
- f. ACCESSORIES
 - 1) Locking:
 - (a) Master keyable cylinder operable from both sides of opening, options for all types of operation. Provide interlock switches or motor mounted interlock switches.

2.04 ELECTRIC OPERATED INSULATED ROLLING COUNTER DOORS.

A. Basis of Design: Cornell Model- ESC30

B. Material:

- 1. Slat Configuration:
 - a. **Galvanized Steel with Finish as Described Below: No. 1F, interlocked flat-faced slats, 1-1/2 inches (38 mm) high by 1/2 inch (13 mm) deep, minimum 22 gauge ASTM A 653, Commercial Quality, galvanized steel with extruded tubular aluminum bottom bar with continuous lift handle and vinyl astragal. Gray PVC backer slat.**
 - b. Finish: Powder Coat
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils 0 inch (0.06 mm) cured film thickness; ASTM D3363 pencil hardness: H or better
 - 2) Color: to be selected from manufacturer's full color range
 - c. Insulation: 3/8 inch (9.5 mm) open cell melamine
 - d. Total Slat Thickness: .545 inch (13.8 mm)
 - e. Flame Spread Index of 15 and a Smoke Developed Index of 450 as tested per ASTM E84
 - f. R-value: 2.0
 - g. U-Factor: .88
- 2. Endlocks:
 - a. Alternate slats each secured with two 1/4" [0.25] inch ([6.35] mm) rivets. Fabricate interlocking sections with high strength.
 - b. Provide endlocks/windlocks as required to meet specified wind load.
- 3. Guides
 - a. Fabrication: Stainless Steel: 12 gauge formed shapes
 - b. Finish: Stainless Steel: type 304 #4 finish
- 4. Counterbalance Shaft Assembly:
 - a. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of [0.03] inches ([0.76] mm) per foot ([0.1] inch ([2.5] mm) per meter) of width
 - b. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque
- 5. Brackets:
 - a. Fabricate from minimum 3/16 inch (5 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures
 - b. Finish Powder Coat:

- 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils [0] inch ([0.06] mm) cured film thickness; ASTM D3363 pencil hardness: H or better.
- 2) Color: to be selected from manufacturer's full color range
6. Hood:
 - a. Galvanized steel with reinforced top and bottom edges. Provide intermediate support brackets as required.
 - b. Finish Powder Coat:
 - 1) Zirconium pre-treatment followed by baked-on polyester powder coat. minimum 2.5 mils [0] inch ([0.06] mm) cured film thickness; ASTM D3363 pencil hardness: H or better.
 - 2) Color: to be selected from manufacturer's full color range
7. Weatherstripping:
 - a. Bottom Bar: Replaceable, bulb-style, compressible EDPM gasket extending into guides
 - b. Guides: Vinyl strip sealing against fascia side of curtain
 - c. Hood: Neoprene/rayon baffle to impede air flow above coil
 - d. Lintel Seal: Nylon brush seal fitted at door header to impede air flow
8. Rapid Response:
 - a. Curtain Configuration:
 - 1) 3 feet of extra curtain material
 - b. **Guide Configuration:** 56" removable lower guide section for quick access to curtain for repairs
 - c. Impactable Bottom Bar:
9. Operation
 - a. Motor – Standard Use – Model MG (Industrial Duty Gear Head) Operator: The operator must not extend above or below the door coil when mounted front-of-coil. Rated for a maximum of 20 cycles per hour (not to be used for consecutive hours) cULus listed (to comply with UL requirements in The United States and Canada), Totally Enclosed Non Ventilated gear head operator(s) rated 1/2 hp as recommended by door manufacture for size and type of door, 120 Volts, single Phase. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, emergency manual chain hoist and control station(s). Motor shall be high starting torque, industrial type, protected against overload with an auto-reset thermal sensing device. Primary speed reduction shall be heavy-duty, lubricated gears with mechanical braking to hold the door in any position. Operator shall be equipped with an emergency manual chain hoist assembly that safely cuts operator power when engaged. A disconnect chain shall not be required to engage or release the manual chain hoist Operator drive and door driven sprockets shall be provided with #50 roller chain. Provide an integral Motor Mounted Interlock system to prevent damage to door and operator when mechanical door locking devices are provided. Operator shall be capable of driving the door at a speed of up to 9" per second or as recommended for door size. Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.
10. Control Station
 - a. **Surface mounted:** "Open/Close" key switch with "Stop" push button; NEMA 3R

11. Control Operation:
 - a. Constant Pressure to Close:
 - 1) 2-wire, electric sensing edge seal extending full width of door bottom bar. Contact before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Provide a retracting safety cord and reel connection to control circuit.
12. Momentary Contact to Close:
 - a. Fail-safe, UL325-2010 Compliant Entrapment Protection for Motor Operation.
13. Sensing/Weather Edge:
 - a. Automatic reversing control by an automatic sensing switch within neoprene or rubber astragal extending full width of door bottom bar.
14. Accessories
 - a. Locking
 - 1) Master keyable cylinder operable from both sides of opening, options for all types of operation. Provide interlock switches or motor mounted
 - b. Countertop:
 - 1) Stainless steel 14 gauge type 304 #4 finish: "T" shaped design for face of wall mounted unit of size and configuration for opening size and wall construction
 - c. Operator [and Bracket Mechanism] Cover

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates
- C. Commencement of work by installer is acceptance of substrate

3.02 INSTALLATION

- A. Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports
- B. Follow manufacturer's installation instructions

3.03 ADJUSTING

- A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion

3.04

- A. Clean surfaces soiled by work as recommended by manufacturer
- B. Remove surplus materials and debris from the site

3.05

- A. Demonstrate proper operation to Owner's Representative
- B. Instruct Owner's Representative in maintenance procedures

END OF SECTION 08 33 00

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Infill panels of glass.
- C. Weatherstripping.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping: Firestop at system junction with structure.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.
- C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- E. AAMA 612 - Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum; 2015.
- F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- G. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- H. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- I. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- J. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- M. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

- N. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- O. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).
- P. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).
- Q. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples 6 x 6 inches (152 x 152 mm) in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- F. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
 - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).
 - b. Safety Glazing Certification Council (SGCC).
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

- C. Provide 10 year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aluminum-Framed Storefronts:
1. Kawneer North America: www.kawneer.com/#sle.
 2. YKK AP America, Inc: www.ykkap.com/commercial/#sle.
 3. Basis of Design: EFCO products; www.efcocorp.com.
 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Center-Set Style, Thermally-Broken:
1. Basis of Design: EFCO series 403X.
 2. Description: Center set, exterior flush glazed; jambs and vertical mullions continuous; head, sill, intermediate horizontal attached by screw spline joinery.
 3. Components: Manufacturer's standard extruded aluminum mullions, 90 degree corner posts, entrance door framing, and indicated shapes.
 4. Dual Thermal Barrier: Provide dual continuous thermal barriers by means of poured and debridged pockets consisting of a two-part, chemically curing high density polyurethane which is bonded to the aluminum.
 5. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep (51 mm wide by 114 mm deep).
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of manufacturers listed above .

2.03 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
1. Unitized, shop assembly.
 2. Glazing Rabbet: For 1 inch (25 mm) insulating glazing.
 3. Glazing Rabbet: For 1/4 inch (6 mm) monolithic glazing.
 4. Glazing Position: Centered (front to back).
 5. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep (50 mm wide by 114 mm deep).
 6. Finish: Class I natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 7. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 8. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 10. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

11. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 12. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 13. Maintain continuous air barrier and/or vapor retarder seal throughout assembly, primarily in line with inside pane of glazing, and heel bead of glazing compound.
- B. Performance Requirements
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of ASCE 7.
 - b. See structural drawings for lateral load design factors.
 - c. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
 2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 10 psf (480 Pa).
 3. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 6.27 psf (300 Pa) pressure difference.
 4. Condensation Resistance Factor of Framing: 60, minimum, measured in accordance with AAMA 1503.
 5. Overall U-value Including Glazing: 0.36 Btu/(hr sq ft deg F) (2.04 W/(sq m K)), maximum.

2.04 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Framing members for interior applications need not be thermally broken.
 2. All aluminum frame extrusions shall have a minimum wall thickness of .080" (2 mm).
 3. Glazing Stops: Flush.
- B. Glazing: See Section 08 80 00.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Exposed Flashings and Sills: Aluminum sheet, 11 gauge, 0.125 inch (3.18 mm) minimum thickness; finish to match framing members.
- D. Concealed Flashings: Sheet aluminum, 20 gauge, 0.032 inch (0.81 mm) minimum thickness.
- E. Sill Flashing Sealant: Silicone, compatible with flashing material.
- F. Sealant for Setting Thresholds: Non-curing butyl type.
- G. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.06 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Provide low-expansion foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Install hardware using templates provided.
- J. Install glass using glazing method required to achieve performance criteria; see Section 08 80 00.
- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.04 FIELD QUALITY CONTROL

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.
- B. See Section 01 40 00 - Quality Requirements for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- C. Provide field testing of installed storefront system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of three tests in each designated area as directed by Architect.
 - 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
 - 3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf (200 Pa).
 - a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce (14 gram) that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
 - 4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 6.20 psf (300 Pa).

- a. Maximum allowable rate of air leakage is 1.5 times specified rate of 0.06 cfm/sq ft (0.3 L/s sq m).
- D. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 08 43 13

SECTION 08 71 00 - 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. Electromechanical door hardware.
 3. Cylinders specified for doors in other sections.
- C. Codes and References: Comply with the version year 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. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
 8. State Building Codes, Local Amendments.
- D. 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. Shop Drawings: Details of electrified access control hardware indicating the following:
 - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. 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.
- E. 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.
- F. 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.

1.4 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.
 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

- 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.

1.5 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".

1.6 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.

1.7 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 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01,

Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

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 the all out-swinging lockable doors.
 5. Manufacturers:
 - a. Hager Companies (HA) - BB Series, 5 knuckle.
 - b. McKinney (MK) - TA/T4A Series, 5 knuckle.
 - c. dormakaba Best (ST) - F/FBB Series, 5 knuckle.

2.3 CONTINUOUS HINGES

- A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Where specified, provide modular continuous geared hinges that ship in two or three pieces and form a single continuous hinge upon installation.
2. Manufacturers:
 - a. Hager Companies (HA).
 - b. Pemko (PE).
 - c. Dormakaba Best (ST).

B. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:
 - a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
 - b. Pemko (PE).
 - c. Dormakaba Best (ST).

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
 - a. Ives (IV).
 - b. Rockwood (RO).
 - c. Trimco (TC).

B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:
 - a. Ives (IV).
 - b. Rockwood (RO).
 - c. Trimco (TC).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
6. Manufacturers:
 - a. Ives (IV).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.5 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.
- 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: Manufacturer's Standard.
- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents.
 1. Patented 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. Corbin Russwin (RU) - Access 3 AP.
 - b. Medeco (MC) - X4.
 - c. Sargent (SA) - Degree DG1.

- E. 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.

- F. 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).
 - 4. Construction Control Keys (where required): Two (2).
 - 5. Permanent Control Keys (where required): Two (2).

- G. Construction Keying: Provide temporary keyed construction cores.

- H. 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.

2.6 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).

2.7 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all features and functionality as specified herein.
 - 1. Electromechanical locksets shall have the following features and functionality:
 - a. Electromechanical locksets shall be provided with universal Molex plug-in connectors that have standardized color-coded wiring and be available in fail safe or fail secure and operate from 12vdc to 24vdc regulated.

- b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
 - c. Options to be available for request-to-exit or enter signaling, latchbolt and deadbolt monitoring.
 - d. Two-year limited warranty on electrified functions.
2. Manufacturers:
- a. Corbin Russwin Hardware (RU) - ML2000 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
 - c. Schlage (SC) - L9000 Series.

2.8 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.

2.9 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. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 7. 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.
 8. 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.
 9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 10. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 12. 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 panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.
 - c. Von Duprin (VD) - 35A/98 XP Series.
- C. Steel Removable Mullions: ANSI/BHMA A156.3 steel removable mullions with options for fire rating, locking, through-wire electrification and hurricane compliance as specified.
1. Manufacturers:
 - a. Same as exit device manufacturer.
- 2.10 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. LCN Closers (LC) - 4040 Series.
 - b. Norton Rixson (NO) - 7500 Series.
 - c. Sargent Manufacturing (SA) - 351 Series.
- C. Door Closers, Surface Mounted (Unitrol): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted closers with door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.
1. Manufacturers:
 - a. Arrow, formerly known as Yale (YA) - Unitrol Series.
 - b. Corbin Russwin Hardware (RU) - Unitrol Series.
 - c. Norton Rixson (NO) - Unitrol Series.
- D. Door Closers, Overhead Concealed Double Acting (Heavy Duty): Center pivot, double acting ANSI/BHMA 156.4 Grade 1 Certified Products Directory (CPD) overhead door closers. UL Listed and ADA-compliant for interior or exterior doors up to 250 lbs. Closers are non-handed, with adjustable spring strength, hydraulic back check, and two closing speed adjustments for sweep and latch. Latch speed can be independently adjustable per door direction. Cast iron body construction with 1-1/4" dual pistons and an optional hold open feature. Closer bodies shall fit in a 1-3/4" x 4" metal or aluminum transom and 2-1/2" x 4-1/2" wood frame.

1. Manufacturers:
 - a. dormakaba (DO) - RTS88 Series.
 - b. LCN Closers (LC) - 6030 Series.
 - c. Norton Rixson (RF) - 73 Series.

2.11 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Ives (IV).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.12 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. 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. Ives (IV).
 - b. Rockwood (RO).
 - c. Trimco (TC).

- C. 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 (RF).
 - b. Rockwood (RO).
 - c. Sargent Manufacturing (SA).

2.13 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 NPFA 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. Reese Enterprises, Inc. (RE).
 3. Zero (ZE).

2.14 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.

2.15 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.

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. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. 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

SECTION 08 06 71 – DOOR HARDWARE SCHEDULE

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 references specification sections relating to commercial door hardware for the following:
1. Swinging doors.
 2. Other doors to the extent indicated.
- B. Commercial door hardware includes, but is not necessarily limited to, the following:
1. Mechanical door hardware.
 2. Electromechanical and access control door hardware.
 3. Cylinders specified for doors in other sections.
- C. Related Sections:
1. Division 08 Section 087100 “Door Hardware”.
- D. Codes and References: Comply with the version year 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: Reference Related Sections for requirements regarding compliance with applicable industry standards.

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.
 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: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- D. 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.
- E. 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 Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 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".

1.5 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.

1.6 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Refer to "PART 3 – EXECUTION" for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

- A. The door 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. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 08 71 00 – Door Hardware.

C. Manufacturer’s Abbreviations:

1.	MK - McKinney		
2.	MR - Markar		
3.	PE - Pemko		
4.	SU - Securitron		
5.	RO - Rockwood		
6.	SA - SARGENT		
7.	OT - Other		
8.	RI - RITE Door		
9.	NO - Norton		
10.	MC - Medeco		
11.	HS - HES		
12.	RF - Rixson		
13.	LU - Lund Equipment Co		
14.	SW-Salto Wireless		

Hardware Sets					
Set: 1.0					
Doors: FH15A,					
2	Continuous Hinge	CFM-SLF-HD1-PT		PE	
1	Mullion	L980A	US28	SA	
1	Rim Exit Device, Storeroom	16 43 55 56 63 Less Pull	US32D	SA	
1	Rim Exit Device, Exit Only	16 43 53 55 56 63 8810 EO	US32D	SA	

4	Interchangeable Core	322401_GMK	26	MC		
1	Pull	RM201 Mtg-Type 12XHD	US32D-316	RO		
2	Conc Overhead Stop	6-X36	630	RF		
2	Surface Closer	J7500 x mounting plate to suit application	689	NO		
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Weatherstrip	- Integral within construction of door and frame assembly		OT		
2	Sweep	29326CNB TKSP		PE		
1	Threshold	1715AK MSES25SS		PE		
	Elec.power transfer	EL-CEPT	630	SU		
	ElectroLynx Harness	QC-C1500P (power transfer or electric strike to junction box above)		MK		
	ElectroLynx Harness	QC-C (power transfer to exit device rail)		MK		
	Card Reader			OT		
	Power supply			OT		
Set: 2.0						
Doors: FH12.1, FH16.1, FH15.1						
2	Continuous Hinge	CFM-SLF-HD1-PT		PE		
2	Elec.power transfer	EL-CEPT	630	SU		
2	Electric Concealed Vert Rod Egress	16 43 60 8704 EO	US32D	SA		
2	Interchangeable Core	322401_GMK	26	MC		
2	Surface Closer	7500 - pull side mount	689	NO		Integral hold open
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Weatherstrip	- Integral within construction of door and frame assembly		OT		
2	Sweep	29326CNB TKSP		PE		
1	Threshold	1715AK MSES25SS		PE		
1	ElectroLynx Harness	QC-C1500P (power transfer or electric strike to junction box		MK		

		above)				
1	ElectroLynx Harness	QC-C (power transfer to exit device rail)		MK		
1	Card reader					
<u>Set: 3.0</u>						
Doors: E6A, FH18.2						
1	Continuous Hinge	CFM-HD1-M		PE		
1	Salto Wireless	XS4 One				
1	Interchangeable Core	322401_GMK	26	MC		
1	Surface Closer	7500 - pull side mount	689	NO		Integral stop
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Gasketing	2891APK TKSP8		PE		
1	Rain Guard	346C TKSP8		PE		
1	Door Bottom	216AFG TKSP		PE		
1	Threshold	252x3AFG Pemkote MSES25SS		PE		
<u>Set: 4</u>						
Doors: FH10, FH11, FH22, FH14A						
3	Hinge, Full Mortise	TA2714	US26D	MK		
1	Salto Wireless	SX4 ONE		SW		
1	Interchangeable Core	322401_GMK	26	MC		
1	Surface Closer	7500 - pull side mount	689	NO		
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Wall Stop	400 /441CU	US26D	RO		
3	Silencer	608 / 609		RO		
1	Coat Hook	796	US26D	RO		FH14A only
<u>Set: 5.0</u>						
Doors: E2, E3, E4.1, E4.2, E5.1, E5.2,						

3	Hinge, Full Mortise	TA2714	US26D	MK		
1	Salto Wireless	SX4 ONE				
1	Interchangeable Core	322401_GMK	26	MC		
1	Surface Closer	PR7500	689	NO		With integral stop
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Gasket	2891APK TKSP8		RO		
1	Rain Guard	346C TKSP8		PE		
1	Door Bottom	216AFG TKSP		PE		
1	Threshold	252x3AFG Pemkote MSES25SS		PE		
<u>Set: 6.0</u>						
Doors: FH03.1, FH03.2						
3	Hinge, Full Mortise	TA2714	US26D	MK		
1	Salto Wireless	XS4 ONE		SW		
1	Interchangeable Core	322401_GMK	26	MC		
1	Surface Closer	7500 - pull side mount	689	NO		With stop
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Gasketing	S88BL		PE		
<u>Set: 7.0</u>						
Doors: FH08, FH09,						
3	Hinge, Full Mortise	TA2714	US26D	MK		
1	Privacy Lock	LB V21 8265 LNL	US26D	SA		With occupancy indication
1	Surface Closer	7500 - pull side mount	US26D	RO		Integral stop
1	Gasket	S88BL		PE		
1	Kick Plate	K1050 10" high CSK BEV	US 32D	RO		
1	Coat Hook	796	US26D	RO		
<u>Set: 8.0</u>						
Doors: E1.1, E1.2,						

1	Continuous Hinge	CFM-SLF-HD1 PT		PE		
1	Rim Exit Device, Exit Only	16 43 55 56 63 8810 EO	US26D	SA		
	Electric Power Transfer	EL-CEPT	630	SU		
1	Surface Closer	7500 - push side mount	689	NO		
1	Weatherstrip	- Integral within construction of door and frame assembly		OT		
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Rain Guard	346C TKSP8	US26D	RO		
1	Door Bottom	216AFG TKSP		PE		
1	Threshold	252x3AFG Pemkote MSES25SS		PE		
1	ElectroLynx Harness	QC-C1500P (power transfer or electric strike to junction box above)		MK		
1	ElectroLynx Harness	QC-C (power transfer to exit device rail)		MK		
1	Card reader			OT		
1	Power Supply			OT		
<u>Set: 9.0</u>						
Doors: FH14, FH18.1 FH19, FH02.1, FH05.1						
1	Continuous Hinge	CFM-HDI PT	US26D	PE		
1	Electric power Transfer	EL-CEPT	US26D	SU		
1	Surface Closer	7500 - push side mount	689	NO		Integral stop
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Rim exit device, storeroom	16 43 53 55 56 63 8804	US32D	SA		
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO		
1	Electrolynx Harness	QC-C1500P (power transfer or electric strike to junction box above)		MK		
1	Electrolynx Harness	QC-C (power transfer to exit device rail)		MK		
1	Card Reader	Security Contractor		OT		

1	Weatherstrip	- Integral within construction of door and frame assembly		OT		
1	Rain Guard	346C TKSP8	US26D	RO		
1	Door Bottom	216AFG TKSP		PE		
1	Threshold	252x3AFG Pemkote MSES25SS		PE		
1	Power Supply					
<u>Set: 10.0</u>						
Doors: FH12.2, FH16.2						
1	Continuous Hinge	CFM-HDI pt	US26D	PE		
1	Surface Closer	7500 - push side mount	689	NO		Integral stop
1	Push Plate	71C (6"x16") CSK BEV	US32D	RO		
1	Push/Pull	T11147 1" diam. 10"	US32D	RO		
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO		

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
- B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.
- D. Section 08 41 26 - All-Glass Entrances and Storefronts: Glazing furnished as part of entrance assembly.
- E. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
- F. Section 08 44 13 - Glazed Aluminum Curtain Walls: Glazing furnished as part of wall assembly.
- G. Section 08 87 23 - Safety and Security Films applied to glazing.

1.03 SUBMITTALS

- A. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- C. Samples: Submit two samples 12 by 12 inch (304 by 304 mm) in size of glass units.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.05 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.
- B. Provide on-site glazing mock-up with the specified glazing components. See Section 04 20 00 .

1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).

- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- C. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Float Glass Manufacturers:
 - 1. Guardian Industries Corp: www.sunguardglass.com.
 - 2. Pilkington North America Inc: www.pilkington.com/na.
 - 3. PPG Industries, Inc: www.ppgideascape.com.
 - 4. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- B. Fire-Resistance-Rated Glass: Provide products as required to achieve indicated fire-rating period.
 - 1. Manufacturers:
 - a. SAFTIFIRST, a division of O'Keeffe's Inc: www.safti.com/#sle.
 - b. Technical Glass Products: www.fireglass.com/#sle.
 - c. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- C. Fire-Protection-Rated Glass: Provide products as required to achieve indicated fire-rating period.
 - 1. Manufacturers:
 - a. SAFTIFIRST, a division of O'Keeffe's Inc: www.safti.com/#sle.
 - b. Technical Glass Products: www.fireglass.com/#sle.
 - c. Substitutions: Refer to Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: Calculated in accordance with ASCE 7.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 4. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.

2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless noted otherwise.
 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
 3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
 4. Impact Resistant Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria; Class A/Category II.
 5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
 1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class A or 16 CFR 1201 - Category II impact test requirements.
 2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch (0.762 mm) thick, minimum.

2.04 BASIS OF DESIGN - INSULATING GLASS UNITS

- A. Type 1 - Vision glazing, with Low-E coating.
 1. Applications: Exterior insulating glass glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Total Thickness: 1 inch (25.4 mm).
 4. Thermal Transmittance (U-Value): 0.24, nominal.
 5. Visible Light Transmittance (VLT): 62 percent, nominal.
 6. Solar Heat Gain Coefficient (SHGC): 0.27, nominal.
 7. Warm-Edge Spacers: Low conductivity thermoplastic and stainless steel.
 - a. Spacer Width: As required for specified insulating glass unit.
 8. Spacer Color: Dark gray.
 9. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 - b. Color: Black.
 10. Basis of Design - Guardian Glass, LLC: www.guardianglass.com.
 11. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Low-E Coating: SunGuard SNX 62/27 on #2 surface.
 12. Inboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick.
 - a. Coating: No coating on inboard lite.
 - b. Glass: Clear.
- B. Type 1A -Sealed Insulating Glass Units: Safety glazing:
 1. Applications: Provide this type of glazing in the following locations:
 - a. Glazed lites in exterior doors.
 - b. Glazed sidelights and panels next to doors.
 - c. Other locations required by applicable federal, state, and local codes and regulations.
 - d. Other locations indicated on the drawings.
 2. Type: Same as Type 1 except use fully tempered float glass for both outboard and inboard lites.
- C. Type 1B -Sealed Insulating Glass Units: Obscure glazing:

1. Applications: Provide this type of glazing in the following locations:
 - a. Other locations indicated on the drawings.
 2. Type: Same as Type 1 except use patterned obscure glass for inboard lite. Both inboard and outboard lites shall be laminated glass.
 - a. Pattern: No. 62
- D. Type 1C -Sealed Insulating Glass Units: Safety/Security glazing:
1. Applications: Provide this type of glazing in the following locations:
 - a. Glazed lites in exterior doors in secure vestibules.
 - b. Glazed sidelights and panels next to doors in secure vestibules.
 - c. Other locations required by applicable federal, state, and local codes and regulations.
 - d. Other locations indicated on the drawings.
 2. Type: Same as Type 1 except:
 - a. Use fully tempered glass for outboard lite.
 - b. Use 1/2 inch laminated safety glass for inboard lite.
 - c. Total thickness: 1-1/4 inches.
 3. Safety and Security Film: See Section 08 87 23 - Safety and Security Films for security films to be applied as shown for secure vestibules and reception areas.
- E. Type 2 - Spandrel glazing.
1. Applications: Exterior spandrel glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Basis of Design - Guardian Glass, LLC: www.guardianglass.com.
 4. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Same as on vision units, on #2 surface.
 5. Inboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick.
 - a. Tint: Clear.
 - b. Opacifier: Elastomeric coating, on #4 surface.
 - c. Opacifier Color: as selected by Architect from manufacturer's full range.
 - d. Basis of Design Coating: OpaciCoat 300.
 6. Total Thickness: 1 inch (25.4 mm).
- F. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another acceptable manufacturer.
- G. Substitution Procedures: See Section 01 60 00 - Product Requirements.
1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.05 GLAZING UNITS

- A. Type 3 - Monolithic Interior Vision Glazing:
1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch (6.4 mm), nominal.
 5. Locations: Interior vision panels, doors and sidelites.
 6. Type 3A: Same as Type 3 except use patterned obscure glass.
 - a. Pattern: No. 62
- B. Type 4 - Fire-Resistance-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and blocks radiant heat, as required to achieve indicated fire-rating period of 60 minutes.
1. Applications:

- a. Glazing in fire-rated window assembly.
 - b. Other locations as indicated on drawings.
 2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
 3. Safety Glazing Certification: 16 CFR 1201 Category II.
 4. Glazing Method: As required for fire rating.
 5. Fire-Rating Period: 60 minutes.
 6. Nominal Thickness: 1-1/8 inch.
 7. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.
 - a. "W" - meets wall assembly criteria of ASTM E119 or UL 263 fire test standards.
 - b. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
 - c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire test standards.
 - d. "T" - meets temperature rise of not more than 450 degrees F (232 degrees C) above ambient at end of 30 minutes fire exposure in accordance with NFPA 252, UL 10B, or UL 10C fire test standards.
 - e. "XXX" - placeholder that represents fire-rating period, in minutes.
 8. Manufacturers:
 - a. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XL 60: www.safti.com/#sle.
 - b. Technical Glass Products; Pilkington Pyrostop 60: www.fireglass.com/#sle.
 - c. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- C. Type 5 - Fire-Protection-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and does not block radiant heat, as required to achieve indicated fire-rating period of 45 minutes.
 1. Applications:
 - a. Glazing in fire-rated door assembly.
 - b. Glazing in fire-rated window assembly.
 - c. Other locations as indicated on drawings.
 2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
 3. Safety Glazing Certification: 16 CFR 1201 Category II.
 4. Glazing Method: As required for fire rating.
 5. Fire-Rating Period: 45 minutes.
 6. Nominal Thickness: 1 inch.
 7. Markings for Fire-Protection-Rated Glazing Assemblies: Provide permanent markings on fire-protection-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction
 - a. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
 - b. "OH" - meets fire window assembly criteria including hose stream test of NFPA 257, or UL 9 fire test standards.
 - c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire tests standards.
 - d. "XXX" - placeholder that represents fire-rating period, in minutes.
 8. Products:

- a. Technical Glass Products; Pilkington Pyrostop 45: www.fireglass.com
 - b. Safti-First SuperLite II-XL 45: safti.com
 - c. Substitutions: See Section 016000.
- D. Type 6 - Fire-Resistance-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and blocks radiant heat, as required to achieve indicated fire-rating period of 90 minutes.
1. Applications:
 - a. Glazing in fire-rated door assembly.
 - b. Other locations as indicated on drawings.
 2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
 3. Safety Glazing Certification: 16 CFR 1201 Category II.
 4. Glazing Method: As required for fire rating.
 5. Fire-Rating Period: 90 minutes.
 6. Nominal Thickness: 1-1/2 inch.
 7. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.
 - a. "W" - meets wall assembly criteria of ASTM E119 or UL 263 fire test standards.
 - b. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
 - c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire test standards.
 - d. "T" - meets temperature rise of not more than 450 degrees F (232 degrees C) above ambient at end of 30 minutes fire exposure in accordance with NFPA 252, UL 10B, or UL 10C fire test standards.
 - e. "XXX" - placeholder that represents fire-rating period, in minutes.
 8. Manufacturers:
 - a. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XL 90: www.safti.com/#sle.
 - b. Technical Glass Products; Pilkington Pyrostop 90: www.fireglass.com/#sle.
 - c. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- E. Type 7 - Monolithic Ballistic Resistant Safety Glazing: Non-fire-rated.
1. Applications:
 - a. Interior glazed lites in doors in secure vestibules.
 - b. Interior glazed sidelights and vision panels in secure vestibules.
 - c. Other locations indicated on drawings.
 2. Glass Type: Laminated safety glass as specified.
 3. Tint: Clear.
 4. Thickness: 1/2 inch, nominal, comprised of two 1/4" thick annealed glass lites with PVB interlayer.
 5. Safety and Security Film: See Section 08 87 23 - Safety and Security Films
- F. Type 7A - Monolithic Safety Glazing: Non-fire-rated.
1. Applications:
 - a. Interior glazed lites in doors in Gymnasium.
 - b. Glazed view windows and panels in partitions enclosing athletic activity rooms, except in fire-rated walls and partitions.
 - c. Other locations required by applicable federal, state, and local codes and regulations.
 - d. Other locations indicated on drawings.
 2. Glass Type: Laminated safety safety glass as specified.

3. Tint: Clear.
4. Thickness: 1/4 inch (6.4 mm), nominal, comprised of two 1/8" thick annealed glass lites with PVB interlayer.

2.06 GLAZING COMPOUNDS

- A. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- B. Polysulfide Sealant: Two component; chemical curing, non-sagging type; ASTM C920 Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.
- C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; clear color.

2.07 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch (75 mm) long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
 1. Width: As required for application.
 2. Thickness: As required for application.
- D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; color black.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- C. Verify that sealing between joints of glass framing members has been completed effectively.
- D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry immediately before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - PRESSURE GLAZED SYSTEMS

- A. Application - Exterior Glazed: Set glazing infills from exterior side of building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install pressure plates without displacing glazing gasket; exert pressure for full continuous contact.
- E. Install cover plate.

3.06 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.08 PROTECTION

- A. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 08 80 00

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SECTION 08 91 00
LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Louvers, frames, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 08 45 23 - Translucent Wall Assemblies : Louvers that are part of translucent wall assemblies.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.
- D. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.

1.04 SUBMITTALS

- A. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- B. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, and tolerances; head, jamb and sill details; blade configuration, screens, blank-off areas required, and frames.
- C. Samples: Submit two samples 2 by 2 inches (50 by 50 mm) in size illustrating finish and color of exterior and interior surfaces.
- D. Test Reports: Independent agency reports showing compliance with specified performance criteria.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 WARRANTY

- A. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.
 - 1. Finish: Include twenty year coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Louvers:
 - 1. Airolite Company, LLC; Model SCH501: www.airolite.com.

2. Construction Specialties, Inc; Model RSH-5700: www.c-sgroup.com.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
 1. Wind Load Resistance: Design to resist positive and negative wind load indicated on structural drawings for cladding components without damage or permanent deformation.
 2. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft (3.1 g/sq m) water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.
- B. Stationary Storm-Resistant Louvers: Horizontal blade, extruded aluminum construction, with intermediate mullions matching frame.
 1. Free Area: 43%, minimum.
 2. Blades: Airfoil-shaped.
 3. Frame: 5 inches deep (127 mm deep), channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
 - a. For units set in door and window openings, provide 1" glazing pocket frame.
 4. Aluminum Thickness: Frame 12 gauge, 0.0808 inch (2.05 mm) minimum; blades 12 gauge, 0.0808 inch (2.05 mm) minimum.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).

2.04 FINISHES

- A. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch (0.030 mm).

2.05 ACCESSORIES

- A. Blank-Off Panels: Aluminum face and back sheets, polyisocyanurate foam core, 1-1/2 inch (38 mm) thick, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- B. Bird Screen: Interwoven wire mesh of aluminum, 14 gage, 0.0641 inch (1.63 mm) diameter wire, 1/2 inch (13 mm) open weave, diagonal design.
- C. Insect Screen: 18 x 16 size aluminum mesh.
- D. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- E. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.

- C. Set sill members and sill flashing in continuous bead of sealant.
 - D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
 - E. Secure louver frames in openings with concealed fasteners.
 - F. Coordinate with installation of mechanical ductwork.
- 3.03 CLEANING
- A. Strip protective finish coverings.
 - B. Clean surfaces and components.

END OF SECTION 08 91 00

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SECTION 09 05 61

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Broadloom carpet.
 - 3. Carpet tile.
 - 4. Thin-set ceramic tile and porcelain tile.
 - 5. Resinous flooring
 - 6. Resinous matrix terrazzo flooring.
- B. Preparation of new concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- E. Patching compound.
- F. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

- A. Section 01 21 00 - Allowances : Quantity allowances to be included in teh Base Bid.
- B. Section 01 22 00 - Unit Prices: Bid pricing for remediation treatments if required.
- C. Section 01 40 00 - Quality Requirements: Additional requirements relating to testing agencies and testing.
- D. Section 03 30 00 - Cast-in-Place Concrete: Limitations on curing requirements for new concrete floor slabs.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Allowances: See Section 01 21 00 - Allowances .
- B. Unit Prices: See Section 01 22 00 - Unit Prices.
- C. Unit Price for Remedial Floor Coating or Sheet Membrane: Do not include the cost of the floor coating or underlayment in the base bid; state on the bid form the unit price per square foot (square meter) for the floor coating or underlayment, installed, in the event such remediation is required.
 - 1. Base the unit price on a total quantity of 10,000 square feet (1000 square meters).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- C. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
 - 1. Manufacturer's qualification statement.
 - 2. Certificate: Manufacturer's certification of compatibility with types of flooring applied over remedial product.
 - 3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
 - 4. Manufacturer's installation instructions.
 - 5. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.
- D. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.
 - 4. Copies of specified test methods.
 - 5. Recommendations for remediation of unsatisfactory surfaces.
 - 6. Submit report directly to Owner.
 - 7. Submit report not more than two business days after conclusion of testing.
- E. Adhesive Bond and Compatibility Test Report.

1.06 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- C. Contractor's Responsibility Relating to Independent Agency Testing:
 - 1. Provide access for and cooperate with testing agency.
 - 2. Confirm date of start of testing at least 10 days prior to actual start.
 - 3. Allow at least 4 business days on site for testing agency activities.
 - 4. Achieve and maintain specified ambient conditions.
 - 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.
- D. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 REMEDIAL FLOOR COATING MATERIALS

- A. Manufacturer: HPS North America, Inc., a Schönox provider
 - 515 Wilhite Street
 - Florence, AL 35630
 - Phone: (256) 246-0345
 - Fax: (256) 246-0346
 - Email: info@hpsubfloors.com
 - Web: www.hpsubfloors.com
- B. Primer: Schönox EPA Two-part Epoxy-based Moisture Mitigation System.
- C. Self-Leveling Underlayment: Schönox AP Self-leveling Underlayment
- D. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 - 1. Preliminary cleaning.
 - 2. Moisture vapor emission tests; 3 tests in the first 1000 square feet (100 square meters) and one test in each additional 1000 square feet (100 square meters), unless otherwise indicated or required by flooring manufacturer.
 - 3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 5. Specified remediation, if required.
 - 6. Patching, smoothing, and leveling, as required.
 - 7. Other preparation specified.
 - 8. Adhesive bond and compatibility test.
 - 9. Protection.
- B. Remediations:

1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet (1.4 kg per 93 square meters) per 24 hours.
- F. Report: Report the information required by the test method.

3.04 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
 - 1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
 - 2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch (25 mm) in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
 - 3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.
- C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.09 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

3.10 SCHEDULE

- A. Regardless of test results, provide Remedial Floor Coating at all slab-on-grade Basement areas scheduled to receive resilient flooring.
- B. Provide Remedial Floor Coating at upper floor areas that do not pass testing. Allowance (to be included in Base Bid) shall be for 5,000 square feet of remediation. Adjustments to allowance will be done using Unit Prices.

END OF SECTION 09 05 61

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SECTION 09 21 16 – GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.

1.2 RELATED DOCUMENTS

- A. Section 07 92 00 - Joint Sealants

1.3 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members 2012.
- B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units 1999 (Reaffirmed 2016).
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017.
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness 2018.
- I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2020.
- J. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base 2019.
- K. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.
- L. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel 2017.
- M. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing 2018.
- N. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units 2021.
- O. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- P. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels 2019.
- Q. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2016.
- R. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

- S. ASTM E413 - Classification for Rating Sound Insulation 2016.
- T. GA-216 - Application and Finishing of Gypsum Panel Products 2018.
- U. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association 2016.
- V. UL (FRD) - Fire Resistance Directory Current Edition.

1.4 SUBMITTALS

- A. Product Data: Provide data on metal framing, gypsum board, glass mat faced gypsum board, accessories, and joint finishing system.
- B. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- C. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of documented experience.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.
- B. Interior Partitions: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
 - 1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).
 - a. Refer to Drawings for UL Assembly Numbers.

2.2 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.

1. Steel Sheet Components: Comply with ASTM A1003 requirements for metal unless otherwise indicated.
 2. Protective coating: ASTM A653/A653M G40 hot-dip galvanized unless otherwise noted.
 3. Studs: "C" shaped with flat or formed webs with reinforcing ribs.
 - a. Minimum Base-Metal Thickness: 0.019 inches (20 ga equivalent), in addition to the minimum thickness required by performance requirements for horizontal deflection.
 - b. Depth: As indicated on Drawings.
 4. Ceiling Channels: C-shaped.
 5. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- C. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 40 00.
- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- E. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
 3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems specified in Section 07 84 00.
 4. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
- F. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.
1. Products:
 - a. USG Corporation; Drywall Suspension System: www.usg.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.3 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
1. CertainTeed Corporation: www.certainteed.com.
 2. Georgia-Pacific Gypsum: www.gpgypsum.com.
 3. National Gypsum Company: www.nationalgypsum.com/#sle.
 4. USG Corporation: www.usg.com.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, 8'-0" and higher, unless otherwise indicated. Use for inner layer of multi-layer applications, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Mold resistant board is required at all locations.
 4. At All Assemblies: Use type required by indicated tested fire-rated assembly; if no tested fire-rated assembly is indicated, use Type X board, UL or WH listed.
 5. Thickness:

- a. Vertical Surfaces: 5/8 inch.
- b. Ceilings: 5/8 inch.
6. Mold Resistant Paper Faced Products:
 - a. National Gypsum Company; Gold Bond XP Gypsum Board:
www.nationalgypsum.com/#sle.
 - b. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board..
 - c. Lafarge North America Inc; Mold Defense Drywall.
 - d. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Backing Board for Wet Areas:
 1. Application: Surfaces behind tile in wet areas including shower room tile installations.
 2. Application: Exterior soffits where textured acrylic finish systems are indicated.
 3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 5/8 inch.
 - b. Products:
 - 1) Custom Building Products; Wonderboard:
www.custombuildingproducts.com.
 - 2) National Gypsum Company; PermaBase Cement Board:
www.nationalgypsum.com/#sle.
 - 3) USG Corporation; Durock Brand Cement Board: www.usg.com.
 - 4) Substitutions: See Section 01 60 00 - Product Requirements.
- D. Backing Board for Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
 1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Type: Type X, in locations indicated.
 5. Type X Thickness: 5/8 inch.
 6. Edges: Tapered.
 7. Products:
 - a. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.
 - b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer..
 - c. USG; Fiberock Aqua-Tough Interior Panel..
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
 1. Application: Exterior sheathing, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 4. Core Type: Type X, as indicated.
 5. Type X Thickness: 5/8 inch.
 6. Edges: Square.
 7. Glass Mat Faced Products:

- a. CertainTeed Corporation; GlasRoc Type X Exterior Sheathing: www.certainteed.com/#sle.
- b. Georgia-Pacific Gypsum; DensGlass Sheathing: www.gpgypsum.com/#sle.
- c. National Gypsum Company; Gold Bond eXP Sheathing: www.nationalgypsum.com/#sle.
- d. Substitutions: See Section 01 60 00 - Product Requirements.

F. Finishing

1. Joint Tape
 - a. Interior: precreased paper
 - b. Glass-Mat sheathing: 10X10 glass mesh
 - c. Tile Backing: as recommended by panel Manufacturer.
2. Joint Compound for interior applications
 - a. Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats
 - b. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound
 - c. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound
 - d. Use setting-type compound for installing paper-faced metal trim accessories
 - e. Fill Coat: For second coat, use drying-type, all-purpose compound
 - f. Finish Coat: For third coat, use drying-type, all-purpose compound
 - g. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish
3. Joint Compound for Exterior Applications
 - a. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound
 - b. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer
4. Joint Compound for Tile Backing Panels
 - a. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer
 - b. Cementitious Backer Units: As recommended by backer unit manufacturer
 - c. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound

2.4 ACCESSORIES

- A. Acoustic Insulation: As specified in Section 07 21 00.
- B. Acoustic Sealant: As specified in Section 07 92 00; Type 5.
- C. Finishing Accessories: ASTM C1047, paper-faced galvanized steel, unless noted otherwise.
 1. Types: As detailed or required for finished appearance.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 2. Chemical hardening type compound.

- E. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
 - 1. Products:
 - a. CertainTeed Corporation; Level V Wall and Ceiling Primer/Surfer with M2Tech: www.certainteed.com/#sle.
 - b. USG Sheetrock Brand Tuff-Hide Primer-Surfer.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- H. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.2 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members at 16 inches on center.
 - 1. Level ceiling system to a tolerance of 1/120.
 - 2. Laterally brace entire suspension system.
- C. Studs: Space studs as required by performance requirements for horizontal deflection, 16 inches on center maximum.
 - 1. Extend partition framing to underside of structure as indicated.
 - 2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
 - 1. Orientation: Horizontal.
 - 2. Spacing: At 16 inches on center.

- F. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall mounted cabinets.
 - 3. Plumbing fixtures.
 - 4. Toilet partitions.
 - 5. Toilet accessories.
 - 6. Wall mounted door hardware, including wall stops.
 - 7. Handrails and wall brackets.
 - 8. Display cases, markerboards, tack boards.
 - 9. TV and monitor mounts.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - a. Place two beads continuously on substrate before installation of perimeter framing members.
 - b. Place continuous bead at perimeter of each layer of gypsum board.
 - c. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.4 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board parallel to framing, with ends and edges occurring over firm bearing.
- C. Double-Layer Non-Rated: Use gypsum board for first layer, placed perpendicular to framing or furring members, with ends and edges occurring over firm bearing. Place second layer parallel to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
 - 1. Seal joints, cut edges, and holes with water-resistant sealant.
- F. Exterior Soffits: Install cementitious backing boards perpendicular to framing, with staggered end joints over framing members or other solid backing.
 - 1. Seal joints, cut edges, and holes with water resistant sealant.
- G. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108/A118/A136.1 and manufacturer's instructions.

- H. Installation on Metal Framing: Use screws for attachment of gypsum board.
- I. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on the drawings. Provide vent area specified.

3.6 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- B. Paper Faced Gypsum Board: Use paper or fiberglass joint tape, bedded with chemical hardening type joint compound and finished with chemical hardening type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: not required.
 - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 4. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling and sanding is not required at base layer of double layer applications.

3.7 TOLERANCES

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

END OF SECTION

NEW CASTLE COUNTY VOCATIONAL –
TECHNICAL SCHOOL DISTRICT

PAUL M. HODGSON VOCATIONAL
TECHNICAL HIGH SCHOOL

SECTION 09 51 00 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Acoustical sealant.
- B. Section 09 54 20 - Specialty Ceiling Systems: Specialty ceilings and grids.
- C. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Sprinkler heads in ceiling system.
- D. Section 23 37 00 - Air Outlets and Inlets: Air diffusion devices in ceiling.
- E. Section 26 51 00 - Interior Lighting: Light fixtures in ceiling system.
- F. Section 27 51 16 - Public Address Systems: Speakers in ceiling system.
- G. Section 28 46 00 - Fire Detection and Alarm: Fire alarm components in ceiling system.

1.03 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2013.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2014.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical 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. Do not install acoustical units until after the interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components, acoustical units, and other related components.
- C. Samples: Submit two samples 12 x 12 inch (305 x 305 mm) or of size illustrating material and finish of acoustical units.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and related work.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: 100 sq ft of each type and size.

1.06 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with a minimum of three years documented experience.

- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.08 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical 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 acoustical units after interior wet work is dry.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. USG: www.usg.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspension Systems:
 - 1. Same as for acoustical units.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Glass Fiber Acoustical Panels (ACP-1): Painted mineral fiber, ASTM E 1264 Type 1ASTM E1264 Type XII, with the following characteristics:
 - 1. Size: 24 by 24 inches.
 - 2. Thickness: 7/8 inches.
 - 3. Composition: Wet formed.
 - 4. NRC Range: .80 to .85, determined as specified in ASTM E1264.
 - 5. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
 - 6. Edge: Beveled Tegular.
 - 7. Surface Color: White.
 - 8. Surface Pattern: fine texture.
 - 9. Product:
 - a. Armstrong: Health Zone Ultima High NRC, Item No 1447
 - b. USG: Mars ClimaPlus Healthcare, Item No. 86152
 - c. Certainteed: Approved Equal
 - 10. Suspension System: Exposed grid Type 1.
 - 11. Location: Concession, Offices, Athletic Trainer Room, and Official Changing and as noted on drawings.
- C. Vinyl-laminated face with sealed back and edges for use in cleanroom environments up to Class 100/ISO 5 Acoustical Panels (ACP-2): ASTM E 1264 Type 1ASTM E1264 Type XII, with the following characteristics:
 - 1. Size: 24 by 24 inches.
 - 2. Thickness: 1/2 inches.
 - 3. Composition: Wet formed.

4. NRC Range: .80 to .85, determined as specified in ASTM E1264.
5. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
6. Edge: Square.
7. Surface Color: White.
8. Surface Pattern: smooth textured vinyl.
9. Product:
 - a. Armstrong: Kitchen Zone, Item No 673
 - b. USG: Sheetrock Brand Clean Room Lay-in Ceiling Panel, Item No 3270
 - c. Certainteed: Approved Equal
10. Suspension System: Exposed grid Type 2.
11. Location: Women Toilet Rooms FH05 & FH026.

2.03 SUSPENSION SYSTEM(S) AND PERIMETER TRIM

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Exposed Steel Suspension System Type 1: Formed galvanized steel, commercial quality cold rolled; intermediate-duty.
 1. Profile: Tee; 15/16 inch wide face.
 2. Construction: Double web.
 3. Finish: White painted.
 4. Products:
 - a. DX by USG
 - b. Prelude XL; Armstrong
 - c. EZ Stab Classic; Certainteed
- C. Exposed Steel Suspension System Type 2: Where this designation is indicated, provide acoustical panel ceiling suspension system complying with the following:
 1. Products:
 - a. ZXLA; USG
 - b. Prelude Plus; Armstrong
 - c. EZ Stab Classic Environmental Aluminum Capped; Certainteed
 2. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized-Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet hot-dip galvanized according to ASTM A 653/A 653M, G60 (Z180) coating designation, with pre-finished, 15/16-inch- (24-mm-) wide, aluminum caps on flanges; other characteristics as follows:
 - a. Aluminum Cap Finish: Painted white.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.
- C. Hangars for "Cloud" Applications including Perimeter Trim: Aircraft Cable.
- D. Hold-Down Clips: Manufacturer's standard clips to suit application.
- E. Perimeter Moldings: Same material and finish as grid.
 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- F. Acoustical Insulation: Specified in Section 07 21 00.

- G. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.
 - 1. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834 and the following requirements:
 - a. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Acoustical Sealant for Exposed and Concealed Joints:
 - 1) PL Acoustical Sealant; Chemrex, Inc., Contech Brands.
 - 2) AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
 - 3) SHEETROCK Acoustical Sealant; United States Gypsum Co.
- H. Touch-up Paint: Type and color to match acoustical and grid units.
- I. Fiberglass Edge Sealant: For re-sealing cut fiberglass edges.
- J. Stabilizer bars: for plank acoustical tile installations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M and ASTM E580/E580M and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected ceiling plans.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. 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.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m). Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- K. Form expansion joints .. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.
- L. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) from ends of each member.
- M. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- N. Install special brake-metal shapes at window heads so that they are square and finished to provide a precise fit. Do not use exposed fasteners.
- 3.04 INSTALLATION - ACOUSTICAL UNITS
- A. Install acoustical units in accordance with manufacturer's instructions.
 - B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
 - C. Lay directional patterned units with pattern parallel to longest room axis.
 - D. Fit border trim neatly against abutting surfaces.
 - E. Install units after above-ceiling work is complete.
 - F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
 - G. Cutting Acoustical Units:
 1. Cut to fit irregular grid and perimeter edge trim.
 2. Make field cut edges of same profile as factory edges.
 3. Double cut and field paint exposed reveal edges.

H. Where round obstructions, other similar conditions, bullnose concrete block corners, and other similar conditions occur, provide preformed closures to match perimeter molding.

I. Install hold-down clips on panels within 20 ft of an exterior door, and the following locations:

1. Large Group Toilet Rooms

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient base.
- B. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.03 PRICE AND PAYMENT PROCEDURES

1.04 REFASTM D2047 ERENCE STANDARDS

- A. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine; 2011.
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).
- C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.
- D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Verification Samples: Submit two samples, 12 by 12 inch (___ by ___ mm) in size illustrating color and pattern for each resilient flooring product specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store all materials off of the floor in an acclimatized, weather-tight space.
- B. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).

- C. Protect roll materials from damage by storing on end.

1.08 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 PRODUCTS

2.01 RESILIENT BASE

- A. Resilient Base [Type RB-1]: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Manufacturers:
 - a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
 - b. Mannington Commercial: www.manningtoncommercial.com/#sle.
 - c. Roppe Corporation: www.roppe.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648, NFPA 253, ASTM E 648, or NFPA 253.
 - 3. Height: 4 inches (100 mm).
 - 4. Thickness: 0.125 inch (3.2 mm).
 - 5. Finish: Satin.
 - 6. Length: Roll.
 - 7. Color: Color as selected from manufacturer's standards.

2.02 ACCESSORIES

- A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 - 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Clean substrate.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 - 1. Spread only enough adhesive to permit installation of materials before initial set.

2. Fit joints and butt seams tightly.
 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Loose-Laid Installation: Set flooring in place in accordance with manufacturer's instructions.
- 3.04 INSTALLATION - RESILIENT BASE
- A. Fit joints tightly and make vertical. Maintain minimum dimension of 24 inches (610 mm) between joints.
 - B. Install base on solid backing. Bond tightly to wall and floor surfaces.
 - C. Scribe and fit to door frames and other interruptions.
- 3.05 CLEANING
- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
 - B. Clean in accordance with manufacturer's written instructions.

END OF SECTION 09 65 00

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SECTION 09 67 00
FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fluid-applied flooring and base.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between fluid-applied flooring and adjacent construction and fixtures.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.
- C. Section 09 30 00 : Sloped mortar bed for shower areas.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- C. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.
- C. Samples: Submit two samples, 4 by 4 inch (101 by 101 mm) in size illustrating color and pattern for each floor material for each color specified.
- D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and application rate for each coat.
- F. Manufacturer's Qualification Statement.
- G. Applicator's Qualification Statement.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section.
 - 1. Minimum five years of documented experience.
 - 2. Approved by manufacturer.

1.06 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Construct mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
 - 1. Number of Mock-Ups to be Prepared: One.

2. Use same materials and methods for use in the work.
 3. Locate where directed.
 4. Minimum Size: 48 inches by 48 inches (1220 mm by 1220 mm).
- C. Obtain approval of mock-up by Architect before proceeding with work.
- D. Approved mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.08 FIELD CONDITIONS

- A. Maintain minimum temperature in storage area of 55 degrees F (13 degrees C).
- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fluid-Applied Flooring:
 1. Crossfield Products Corp: www.crossfieldproducts.com/#sle.
 2. Sherwin-Williams High-Performance Flooring: www.sherwin-williams.com/resin-flooring/#sle.
 3. Basis of Design: Stonhard: www.stonhard.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FLUID-APPLIED FLOORING SYSTEMS

- A. Fluid-Applied Flooring and Base Type RF-1: Polyurethane mortar base coat(s) with broadcast flakes.
 1. Physical Characteristics:
 - a. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E 648.
 - b. Tensile Strength: 1,000 psi, when tested in accordance with ASTM D 638.
 - c. Compressive Strength: 5,000 psi (34.45 MPa) , when tested in accordance with ASTM C 579.
 - d. Abrasion Resistance: Maximum weight loss of .03 g/1000 cycles, when tested in accordance with ASTM D 4060.
 - e. Impact Resistance: >160 in/lb; no cracking, chipping or delamination, when tested with Gardner Impact Tester.
 2. System Thickness: 3/16 inch (4.76 mm), nominal, dry film thickness (DFT).
 3. Texture: Slip resistant.
 4. Color: As selected by Architect.
 5. Manufacturers and products:
 - a. Basis of Design: Stonhard; Product: Stontec TRF: www.stonhard.com
 - 1) 3 mm urethane flake broadcast flooring system with integral cove base where noted
 - 2) Primer as required by manufacturer, one coat minimum.
 - 3) Body Coat(s): Stonclad UR, urethane, 100% solids.
 - 4) Undercoat: Stontec epoxy undercoat
 - 5) Color Flake Broadcast Layer: Brightly colored vinyl flakes.

- 6) Undercoat and Sealer: Stonseal CA7, a two-component, UV resistant, aliphatic polyaspartic urethane sealer..
- b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fluid-Applied Flooring and Base Type RF-2: Polyurethane mortar base coat(s) with broadcast flakes.
 1. Physical Characteristics:
 - a. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E 648.
 - b. Tensile Strength: 1,000 psi, when tested in accordance with ASTM D 638.
 - c. Compressive Strength: 7,700 psi (34.45 MPa) after 7 days, when tested in accordance with ASTM C 579.
 - d. Abrasion Resistance: Maximum weight loss of 0.10 gm, when tested in accordance with ASTM D 4060, CS-17.
 - e. Impact Resistance: >160 in/lb; no cracking, chipping or delamination, when tested per ASTM D 2794.
 2. System Thickness: 3/16 inch (4.76 mm), nominal, dry film thickness (DFT).
 3. Texture: Slip resistant.
 4. Color: As selected by Architect.
 5. Manufacturers and products:
 - a. Basis of Design: Stonhard; Product: Stonshield UTS: www.stonhard.com
 - 1) self-priming, textured, four-component, polyurethane mortar and broadcast system consisting of a urethane-urea binder, pigments, powders and quartz aggregates
 - 2) Thickness: nominal 1/4 in. (6mm).
 - 3) Mortar: Stonclad UT, four-component multi-functional urethane area slurry.
 - 4) Aggregate: brightly colored quartz broadcast aggregate
 - 5) Color Flake Broadcast Layer: Brightly colored vinyl flakes.
 - 6) Undercoat and Sealer: Stonseal CA7, a two-component, UV resistant, aliphatic polyaspartic urethane sealer..
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C.

2.03 ACCESSORIES

- A. Mortar bed at sloped shower areas: See Section 09 30 00 .
- B. Waterproofing at shower areas: Stonproof ME7 membrane system with Texture #3 broadcast to refusal.
- C. Crack Treatment: Stonhard's Stonproof CT5 or RH7 with Texture #3 broadcast to refusal
- D. Patching, Leveling and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated. No Single component or cementitious materials.
- E. Base Caps and Separator Strips: Match divider strips, with projecting base of 1/8 inch.
- F. Cant Strips: Molded of flooring resin material.
- G. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.
- H. Primers and Adhesives: Waterproof; types recommended by fluid-applied flooring manufacturer.

- I. Divider Strips: Zinc, 1/8 inch thick, height to match flooring thickness, with anchoring features; color as selected.
- J. Control Joint Strips: Match divider strips; 1/8 inch nominal width, 1/8 inch wide neoprene filler strip between side strips, with anchoring features, strip height to suit flooring thickness.
- K. Subfloor Filler: Type recommended by flooring material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for fluid-applied flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test in accordance with Section 09 05 61.
 - 2. Obtain instructions if test results are not within limits recommended by fluid-applied flooring manufacturer.
 - 3. Follow moisture and alkalinity remediation procedures in Section 09 05 61.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
- B. Prepare concrete surfaces according to ICRI 310.2R, CSP 3.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.
- E. At shower areas, install waterproofing membrane in accordance with manufacturers requirements.
- F. Apply primer in accordance with flooring manufacturers requirements.

3.03 INSTALLATION - ACCESSORIES

- A. Install cant strips at base of walls where flooring is to be extended up wall as base.
- B. Install terminating cap strip at top of base; attach securely to wall substrate.

3.04 INSTALLATION - FLOORING

- A. Apply in accordance with manufacturer's instructions.
- B. Apply each coat to minimum thickness required by manufacturer.
- C. Finish to smooth level surface.
- D. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, of cove base. Round internal and external corners.
- E. Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate at manufacturer's recommended height using specially designed trowel and or Screed box.

- F. Undercoat: Remove any surface irregularities by lightly abrading and vacuuming the floor surface. Mix and apply undercoat with strict adherence to manufacturer's installation procedures and coverage rates.
- G. Broadcast: Immediately broadcast quartz silica aggregate into the undercoat using manufacturer's specially designed spray caster. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.
- H. Apply topcoat in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer.
- I. Install flooring in recessed type floor access covers.
- J. Cove at vertical surfaces: Base height: 6" unless otherwise indicated.

3.05 TERMINATIONS

- A. Chase edges to “lock” the flooring system into the concrete substrate along lines of termination.
- B. Penetration Treatment: Lap and seal the flooring system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.
- C. Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.
- D. Treat floor drains by chasing the flooring system to lock in place at point of termination.

3.06 JOINTS AND CRACKS

- A. Treat control joints to bridge potential cracks and to maintain monolithic protection.
- B. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.
- C. Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.07 CURING, PROTECTION AND CLEANING

- A. Cure resinous flooring materials in compliance with manufacturer's directions.
 - 1. Prohibit traffic on floor finish for 48 hours after installation.
 - 2. Barricade area to protect flooring until fully cured.
- B. Protect resinous flooring materials from damage and wear during construction operation. Comply with manufacturer's recommendations for temporary covering materials and method of application.
- C. Cleaning: Remove temporary covering and clean resinous flooring prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

END OF SECTION 09 67 00

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SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Exposed surfaces of steel lintels and ledge angles.
 - 2. Exposed structural steel.
 - 3. Bollards, downspot boots, and miscellaneous metals.
 - 4. Mechanical and Electrical:
 - a. Exposed exterior piping.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Stainless steel and prefinished aluminum.
 - 6. Floors, unless specifically indicated.
 - 7. Brick, glass unit masonry, architectural concrete, and cast stone.
 - 8. Exterior insulation and finish system (EIFS).
 - 9. Glass.
 - 10. Concrete masonry units in utility and mechanical spaces.
 - 11. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- C. Section 05 51 00 - Metal Stairs: Shop-primed items.
- D. Section 09 91 23 - Interior Painting.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- C. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- D. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 2. MPI product number (e.g. MPI #47).
 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit one paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, and repair of painted and finished surfaces.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; store where directed.
 3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. If a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for .
- C. Paints:
 - 1. Benjamin Moore & Co: www.benjaminmoore.com.
 - 2. Glidden Professional, a product of PPG Architectural Coatings: www.gliddenprofessional.com.
 - 3. PPG Paints: www.ppgpaints.com/#sle.
 - 4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- D. Primer Sealers: Same manufacturer as top coats.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
 - 1) Opaque, Flat: 50 g/L, maximum.
 - 2) Opaque, Nonflat: 150 g/L, maximum.
 - 3) Opaque, High Gloss: 250 g/L, maximum.
 - 4) Varnishes: 350 g/L, maximum.
 - c. Architectural coatings VOC limits of the State in which the Project is located.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Colors: As indicated in Color Schedule.

1. Extend colors to surface edges; colors may change at any edge as directed by Architect.
- 2.03 PAINT SYSTEMS - EXTERIOR
- A. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
 - B. SYSTEM E-1:
 1. Substrate: Structural Steel and Metal Fabrications:
 2. Applications include but are not limited to miscellaneous metal boxes, pipes, and downspout boots.
 3. Manufacturers and products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
 - 2) 2nd Coat: S-W A-100 Exterior Latex Gloss, A8 Series
 - 3) 3rd Coat: S-W A-100 Exterior Latex Gloss, A8 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Super Spec HP Alkyd Metal Primer P06
 - 2) 2nd Coat: Ultra Spec HP DTM Acrylic Enamel Semi-gloss HP29
 - 3) 3rd Coat: Ultra Spec HP DTM Acrylic Enamel Semi-gloss HP29
 - c. Glidden Professional:
 - 1) 1st Coat: Devoe Coatings DEVFLEX Direct-to-Metal 4020 primer
 - 2) 2nd Coat: Glidden Professional Fortis 450 6407 topcoat
 - 3) 3rd Coat: Glidden Professional Fortis 450 6407 topcoat
 - d. PPG:
 - 1) 1st Coat: PPG Pitt-Tech Plus Direct to Metal Primer & Flat Finish 4020PF.
 - 2) 2nd Coat: PPG SPEEDHIDE® Exterior 100% Acrylic Latex Semi-Gloss 6-900XI Series.
 - 3) 3rd Coat: PPG SPEEDHIDE® Exterior 100% Acrylic Latex Semi-Gloss 6-900XI Series.
 - C. SYSTEM E-2:
 1. Substrate: Hollow metal doors and frames:
 2. Finish: Semi-Gloss.
 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: DTM Acrylic Primer/Finish, B66W1
 - 2) 2nd Coat: DTM Acrylic Gloss Coating, B66W100
 - 3) 3rd Coat: DTM Acrylic Gloss Coating, B66W100
 - b. Benjamin Moore:
 - 1) 1st Coat: Super Spec HP Alkyd Metal Primer P06
 - 2) 2nd Coat: Ultra Spec HP DTM Acrylic Enamel Gloss HP28
 - 3) 3rd Coat: Ultra Spec HP DTM Acrylic Enamel Gloss HP28
 - c. PPG:
 - 1) 1st Coat: PPG Pitt-Tech Plus Direct to Metal Primer & Flat Finish 4020PF.
 - 2) 2nd Coat: PPG Pitt-Tech Plus EP DTM Acrylic Gloss 90-1510 Series.
 - 3) 3rd Coat: PPG Pitt-Tech Plus EP DTM Acrylic Gloss 90-1510 Series.
 - D. SYSTEM E-3:
 1. Substrate: Galvanized Metal, Not Chromate Passivated:
 2. Applications include but are not limited to railings and piping, lintels, bollards, structural steel items.
 3. Manufacturers and Products:
 - a. Sherwin Williams:

- 1) 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-1300 Series
- 2) 2nd Coat: S-W Sher-Cryl HPA Gloss, B66-300 Series
- 3) 3rd Coat: S-W Sher-Cryl HPA Gloss, B66-300 Series
- b. Benjamin Moore:
 - 1) 1st Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04
 - 2) 2nd Coat: Benjamin Moore Ultra Spec HP DTM Acrylic Enamel Gloss HP28
 - 3) 3rd Coat: Benjamin Moore Ultra Spec HP DTM Acrylic Enamel Gloss HP28
- c. PPG:
 - 1) 1st Coat: PPG Pitt-Tech Plus Direct to Metal Primer & Flat Finish 4020PF.
 - 2) 2nd Coat: PPG SPEEDHIDE® Exterior 100% Acrylic Latex Semi-Gloss 6-900XI Series.
 - 3) 3rd Coat: PPG SPEEDHIDE® Exterior 100% Acrylic Latex Semi-Gloss 6-900XI Series.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Masonry, Concrete, and Concrete Masonry Units: 12 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Galvanized Surfaces:
 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 2. Prepare surface according to SSPC-SP 2.
- G. Ferrous Metal:
 1. Solvent clean according to SSPC-SP 1.

2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 Commercial Blast Cleaning. Protect from corrosion until coated.

H. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes over dirt, rust, scale, grease, moisture, scuffed surfaces, or other conditions detrimental to formation of a durable coating film; do not apply finishes to surfaces that are not dry.
- D. Use applicators and methods best suited for substrate and type of material being applied and according to manufacturer's instructions.
 1. Brush Application: Use brushes best suited for the type of material applied; use brush of appropriate size for the surface or item being painted; produce results free of visible brush marks.
 2. Roller Application: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Application: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- E. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate; provide total dry film thickness of entire system as recommended by manufacturer.
 1. Number of coats and film thickness required are the same regardless of application method.
 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
 3. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
- F. Apply finish to completely cover surfaces with uniform appearance without brush marks, runs, sags, laps, ropiness, holidays, spotting, cloudiness, or other surface imperfections.
 1. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
 2. Before applying finish coats, apply a prime coat of material recommended by manufacturer, unless the surface has been prime coated by others; where evidence of suction spots or unsealed areas in first coat appear, recoat primed and sealed surfaces to ensure finish coat with no burn through or other defects due to insufficient sealing.
 3. Apply first coat to surface that has been cleaned, pretreated, or otherwise prepared as soon as practical after preparation and before subsequent surface deterioration.
 4. Do not apply succeeding coats until the previous coat has cured as recommended by manufacturer.
 5. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat will not cause the undercoat to lift or lose adhesion.

6. If manufacturer's instructions recommend sanding to produce a smooth, even surface, sand between coats.
 7. Before applying next coat vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
 8. Pigmented (Opaque) Finishes: Provide smooth, opaque surface of uniform finish, color, appearance, and coverage.
- G. Metal Doors to be Painted: Finish metal door top, side, and bottom edge surfaces same as face of door.
- H. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- I. Apply each coat to uniform appearance.
- J. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- K. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- L. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- 3.04 CLEANING
- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- 3.05 PROTECTION
- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 91 13

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SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints and stains.
- C. Materials for backpriming woodwork.
- D. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Prime surfaces to be concealed behind permanently installed fixtures, equipment, and furnishings, prior to installation of the permanent item.
 - 3. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
 - c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- E. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
 - 6. Floors, unless specifically indicated.
 - 7. Brick, architectural concrete, and cast stone.
 - 8. Glass.
 - 9. Acoustical materials, unless specifically indicated.
 - 10. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- C. Section 05 51 00 - Metal Stairs: Shop-primed items.
- D. Section 09 91 13 - Exterior Painting.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2023.

- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- E. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- F. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- G. SSPC-SP 13 - Surface Preparation of Concrete; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 - 2. MPI product number (e.g., MPI #47).
 - 3. Cross-reference to specified paint system products to be used in project; include description of each system.
- C. Samples: Submit one paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years documented experience.

1.06 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide sample resident room, illustrating paint colors, textures, and finishes.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F (3 degrees C) above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 fc (860 lux) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. If a single manufacturer cannot provide specified products; minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
- C. Paints:
 - 1. Benjamin Moore & Co: www.benjaminmoore.com.
 - 2. Glidden Professional, a product of PPG Architectural Coatings: www.gliddenprofessional.com.
 - 3. Pittsburgh Paints: www.ppgpaints.com/#sle.
 - 4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- D. Primer Sealers: Same manufacturer as top coats.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:

1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
 - 1) Opaque, Flat: 50 g/L, maximum.
 - 2) Opaque, Nonflat: 150 g/L, maximum.
 - 3) Opaque, High Gloss: 250 g/L, maximum.
 - 4) Varnishes: 350 g/L, maximum.
 - c. Architectural coatings VOC limits of the State in which the Project is located.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Colors: As indicated on drawings.
1. Extend colors to surface edges; colors may change at any edge as directed by Architect.
 2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

2.03 PAINT SYSTEMS - INTERIOR

- A. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
- B. SYSTEM I-1: Not Used
- C. SYSTEM I-2
1. Substrate: Concrete Masonry Units (Epoxy paint, Semi-gloss finish)
 2. Applications include, but are not limited to: Concrete Masonry Units in spaces scheduled to receive epoxy paint.
 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat:S-W Heavy Duty Block Filler, B42W46
 - 2) 2nd Coat:S-W Pro Industrial Waterbased Catalyzed Epoxy, B73-300 Series
 - 3) 3rd Coat:S-W Pro Industrial Waterbased Catalyzed Epoxy, B73-300 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Corotech Waterborne Epoxy Block Filler V163
 - 2) 2nd Coat: Corotech Waterborne Amine Epoxy V440
 - 3) 3rd Coat: Corotech Waterborne Amine Epoxy V440
 - c. Glidden Professional:
 - 1) 1st Coat:Tru-Glaze 4015 Block Filler
 - 2) 2nd Coat:Tru-Glaze WB 4426 Water-Based Epoxy
 - 3) 3rd Coat:Tru-Glaze WB 4426 Water-Based Epoxy
 - d. PPG:
 - 1) 1st Coat: PPG Speedhide Int./Ext. Masonry Hi Fill Latex Block Filler 6-15XI.
 - 2) 2nd Coat: PPG Aquapon WB EP Water-Based Epoxy 98E-1 Series.
 - 3) 3rd Coat: PPG Aquapon WB EP Water-Based Epoxy 98E-1 Series.
- D. SYSTEM I-3: Not Used.
- E. SYSTEM I-4
1. Substrate: Structural Steel and Metal Fabrications:

2. Applications include, but are not limited to: steel and metal fabrications, piping, hollow metal doors and frames in spaces scheduled to be painted.
3. Finish: Semi Gloss.
4. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: DTM Acrylic Primer/Finish, B66W1
 - 2) 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series.
 - 3) 3rd Coat: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series.
 - b. Benjamin Moore:
 - 1) 1st Coat: Ultra Spec HP Acrylic Metal Primer HP04
 - 2) 2nd Coat: Ultra Spec HP DTM Acrylic Enamel Semi-gloss HP29
 - 3) 3rd Coat: Ultra Spec HP DTM Acrylic Enamel Semi-gloss HP29
 - c. PPG:
 - 1) 1st Coat: PPG Pitt-Tech Plus Direct to Metal Primer & Flat Finish 4020PF.
 - 2) 2nd Coat: PPG Pitt-Tech Plus EP DTM Acrylic Semi-Gloss 90-1610 Series.
 - 3) 3rd Coat: PPG Pitt-Tech Plus EP DTM Acrylic Semi-Gloss 90-1610 Series.

F. SYSTEM I-5

1. Substrate: Galvanized Metal, Not Chromate Passivated:
2. Applications include, but are not limited to, galvanized metal fabrications, ductwork, conduit, and decking, in spaces scheduled to be painted.
3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
 - 2) 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series.
 - 3) 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series.
 - b. Benjamin Moore:
 - 1) 1st Coat: Moore Ultra Spec HP Acrylic Metal Primer HP04
 - 2) 2nd Coat: Ultra Spec HP DTM Acrylic Enamel Semi-gloss HP29
 - 3) 3rd Coat: Ultra Spec HP DTM Acrylic Enamel Semi-gloss HP29
 - c. PPG:
 - 1) 1st Coat: PPG Pitt-Tech Plus Direct to Metal Primer & Flat Finish 4020PF.
 - 2) 2nd Coat: PPG Speedhide Zero Interior Latex Paint Semi-Gloss 6-5510 Series.
 - 3) 3rd Coat: PPG Speedhide Zero Interior Latex Paint Semi-Gloss 6-5510 Series.

G. SYSTEM I-6

1. Substrate: Woodwork (Opaque Semi-Gloss Finish)
2. Applications include, but are not limited to, finish carpentry items indicated to receive an opaque finish.
3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W Premium Wall & Wood Primer, B28W8111
 - 2) 2nd Coat: S-W Pro Industrial Acrylic, B66-650 Series
 - 3) 3rd Coat: S-W Pro Industrial Acrylic, B66-650 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Moore Ultra Spec 500 Interior Latex Primer N534
 - 2) 2nd Coat: Ultra Spec 500 Interior Latex Semi-Gloss T546
 - 3) 3rd Coat: Ultra Spec 500 Interior Latex Semi-Gloss T546
 - c. Glidden Professional:
 - 1) 1st Coat: Glidden Professional High Hide 1000 primer

- 2) 2nd Coat: Glidden Professional Diamond 450 7400 topcoat
 - 3) 3rd Coat: Glidden Professional Diamond 450 7400 topcoat
 - d. PPG:
 - 1) 1st Coat: PPG Seal Grip Interior Primer/Finish 17-951.
 - 2) 2nd Coat: PPG Speedhide Zero Interior Latex Paint Semi-Gloss 6-5510 Series.
 - 3) 3rd Coat: PPG Speedhide Zero Interior Latex Paint Semi-Gloss 6-5510 Series.
 - H. SYSTEM I-7: Not Used.
 - I. SYSTEM I-8: Not Used.
 - J. SYSTEM I-9: Not Used.
 - K. SYSTEM I-10: Not Used.
 - L. SYSTEM I-11
 - 1. Substrate: Gypsum Board (Epoxy Finish):
 - 2. Applications include but are not limited to walls, ceilings, soffits, and bulkheads, in spaces scheduled to receive an epoxy paint finish.
 - 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: PrepRite 200 Int Latex Primer
 - 2) 2nd Coat: ProIndustrial Precat. WB Epoxy, S-G, Series K46
 - 3) 3rd Coat: ProIndustrial Precat. WB Epoxy, S-G, Series K46
 - b. Benjamin Moore:
 - 1) 1st Coat: Ultra Spec 500 Interior Latex Primer N534
 - 2) 2nd Coat: Corotech Pre-Catalyzed Waterborne Epoxy Eggshell V342
 - 3) 3rd Coat: Corotech Pre-Catalyzed Waterborne Epoxy Eggshell V342
 - c. Glidden Professional:
 - 1) 1st Coat: Glidden Professional High Hide 1000 primer
 - 2) 2nd Coat: Devoe Coatings TRU-GLAZE WB Epoxy 4426 topcoat
 - 3) 3rd Coat: Devoe Coatings TRU-GLAZE WB Epoxy 4426 topcoat
 - d. PPG:
 - 1) 1st Coat: PPG Speedhide zero Interior Zero-VOC Latex Sealer 6-4900XI.
 - 2) 2nd Coat: PPG PITT-GLAZE WB1 Interior Eggshell Pre-Catalyzed Water-Borne Acrylic Epoxy 16-1310.
 - 3) 3rd Coat: PPG PITT-GLAZE WB1 Interior Eggshell Pre-Catalyzed Water-Borne Acrylic Epoxy 16-1310.
 - M. SYSTEM I-12
 - 1. Substrate: Concrete Floor (Sealed):
 - 2. Manufacturers and Products:
 - a. W. R. Meadows:
 - 1) 1st Coat: VOCCOMP-30 Concrete Curing and Sealing Compound
 - b. PPG:
 - 1) 1st Coat: Perma-Crete Plex-Seal WB Interior/Exterior Clear Sealer 4-6200XI.
 - N. SYSTEM I-13: Not Used.
- 2.04 ACCESSORY MATERIALS
- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
 - B. Patching Material: Latex filler.
 - C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 3. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 2. Clean concrete according to ASTM D4258. Allow to dry.
 - 3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- G. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 - 2. Prepare surface as recommended by top coat manufacturer.
- H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- J. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- K. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 Commercial Blast Cleaning. Protect from corrosion until coated.

L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes over dirt, rust, scale, grease, moisture, scuffed surfaces, or other conditions detrimental to formation of a durable coating film; do not apply finishes to surfaces that are not dry.
- D. Use applicators and methods best suited for substrate and type of material being applied and according to manufacturer's instructions.
 1. Brush Application: Use brushes best suited for the type of material applied; use brush of appropriate size for the surface or item being painted; produce results free of visible brush marks.
 2. Roller Application: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Application: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- E. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate; provide total dry film thickness of entire system as recommended by manufacturer.
 1. Number of coats and film thickness required are the same regardless of application method.
 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
 3. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
- F. Apply finish to completely cover surfaces with uniform appearance without brush marks, runs, sags, laps, ropiness, holidays, spotting, cloudiness, or other surface imperfections.
 1. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
 2. Before applying finish coats, apply a prime coat of material recommended by manufacturer, unless the surface has been prime coated by others; where evidence of suction spots or unsealed areas in first coat appear, recoat primed and sealed surfaces to ensure finish coat with no burn through or other defects due to insufficient sealing.
 3. Apply first coat to surface that has been cleaned, pretreated, or otherwise prepared as soon as practical after preparation and before subsequent surface deterioration.
 4. Do not apply succeeding coats until the previous coat has cured as recommended by manufacturer.
 5. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat will not cause the undercoat to lift or lose adhesion.
 6. If manufacturer's instructions recommend sanding to produce a smooth, even surface, sand between coats.

7. Before applying next coat vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
 8. Pigmented (Opaque) Finishes: Provide smooth, opaque surface of uniform finish, color, appearance, and coverage.
 - G. Metal Doors to be Painted: Finish metal door top, side, and bottom edge surfaces same as face of door.
 - H. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
 - I. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
 - J. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
 - K. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
 - L. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
 - M. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- 3.04 CLEANING
- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- 3.05 PROTECTION
- A. Protect finishes until completion of project.
 - B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 91 23

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SECTION 10 21 13.19 - PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments.
- B. Urinal screens.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking and supports.
- B. Section 10 28 00 - Toilet Accessories.

1.03 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- B. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and floor supports, door swings.
- D. Samples:
 - Submit manufacturers color selection sheet for initial color selection. Architect may select up to 3. Pdf or electronic copies are not acceptable.
 - Submit min, 4”X4” physical samples of each initially selected color and pattern
 - Submit 12”X12” sample of final selection for approval

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.
- B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

PART 2 PRODUCTS

2.01 PLASTIC TOILET COMPARTMENTS

- A. Basis of Design: Scranton Products “Hiny Hider”. Subject to meeting the basis of design specifications and the Design intent Acceptable manufacturers are
 - 1. ASI Global partitions
 - 2. Bradley Corporation
 - 3. Substitutions: Section 01 60 00 - Product Requirements.

- B. Solid Plastic Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made

of solid molded high density polyethylene (HDPE); floor-mounted headrail-braced; tested and passed in accordance with NFPA 286.

1. Color and Finish: as selected from manufacturer's full range of colors meeting NFPA 286 and ASTM E84
2. Doors:
 - a. Thickness: 1 inch.
 - b. Width: Min 24”.
 - c. Width for Handicapped Use: 36 inch, out-swinging.
 - d. Height: 66 inch.
 - e. Height: 72 inch. 6” AFF at Toilet Rooms: FH05, FH06, FH07, and FH26.
 - f. Shiplap cut edge
3. Panels:
 - a. Thickness: 1 inch.
 - b. Height: 66 inch.
 - c. Height: 72 inch. 6” AFF at Toilet Rooms: FH05, FH06, FH07, and FH26
4. Pilasters:
 - a. Thickness: 1 inch.
 - b. Width: As required to fit space; minimum 3 inch.
5. Urinal Screens: To match compartments; mounted to wall with continuous panel brackets.
 - a. Thickness: 1 inch.
 - b. Depth: 18 inches.
 - c. Height: 55 inch.

2.02 ACCESSORIES

- A. Pilaster Shoes: Stainless steel, satin finish, 3 inches high; concealing floor fastenings.
 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Extruded aluminum, anti-grip profile.
- C. Wall and Pilaster Brackets: Stainless steel; continuous type.
 1. Urinal screen wall brackets: Continuous, extruded aluminum.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 1. For attaching panels and pilasters to brackets: stainless steel tamper resistant torx head sex bolts.
- E. Hinges: Stainless steel; satin finish.
 1. Continuous-type hinge at all locations, self closing at accessible compartments.
- F. Door Hardware: Stainless steel; polished finish, unless otherwise noted.
 1. Door Latch: Slide type with exterior emergency access feature.
 2. Door Strike and Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch. Provide extruded aluminum strikes, full height of door panel.
 3. Provide door pull for outswinging doors.
 4. Provide additional door pull at interior of outswinging doors of accessible stalls.
 5. Coat Hook with Rubber Bumper: One per compartment, mounted on door.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 28 00 - TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial Shower accessories.
- C. Electric hand dryers.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Concealed supports for accessories, including in wall framing and plates and above ceiling framing.
- B. Section 10 21 13.19 - Plastic Toilet Compartments.

1.03 REFERENCE STANDARDS

- A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service 2015.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- D. ASTM C1036 - Standard Specification for Flat Glass 2011.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

PART 2 PRODUCTS

1.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:
 - 1. Toilet and Bath Accessories:
 - a. Basis of Design: Bobrick Washroom Equipment, Inc.
 - b. Unless noted otherwise.
 - c. Substitutions: Section 01 6000 - Product Requirements.

1.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; ASTM B 30, castings.
- C. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch (0.9-mm) minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).
- E. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality Q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- F. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- G. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.
- H. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.

1.3 TOILET ACCESSORIES

- A. REFER TO TOILET ACCESSORIES SCHEDULE IN DRAWINGS FOR ITEMS PROVIDED BY OWNER AND INSTALLED BY CONTRACTOR.
- B. Basis-of-Design Products: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Bobrick Washroom Equipment, Inc.
 - 2. Bradley Corporation.
 - 3. Approved Equal.
- C. Sight & Urinal Screen
 - 1. Basis of Design Product: Bradmar Solid Plastic Urinal Screen or approved equal
 - 2. Material: 1" thick HDPE (Waterproof, non-absorbent, resistant to marks and graffiti)
 - 3. Size: 48" high x 24" wide, 12' AFF
 - 4. Mounting: Wall hung with continuous heavy-duty aluminum 2-ear brackets at 13" o.c.
 - 5. Provide blocking as necessary.
 - 6. Color: TBD by architect from manufacturer's full range.
- D. Lifiable Shower Seat
 - 1. Basis of Design Product: Bradley Folding Phenolic Shower Seat
 - 2. Model #: 9562 or approved equal
 - 3. Finish & Material: Satin Finish Stainless Steel Frame and ½" Solid Phenolic Seat
 - 4. Supports Static Load of 500 lbs
 - 5. ADA Compliant

- E. Shower Curtain Rod
1. Basis of Design Product: Bradley Model #953 or approved equal
 2. Material and Construction: Straight shower curtain rod with 22 ga. Stainless Steel mounting flanges and exposed fasteners. 18 ga. 1" OD seamless stainless steel tubing.
 3. Size: Suitable for 36-72" shower stall.
 4. Finish: Satin Finish
- F. Shower Curtain
1. Basis of Design Product: Bradley Shower Curtain #9537 or approved equal
 2. Antimicrobial 9 oz. nylon-reinforced PVC vinyl shower curtain, white. Reinforced, flameproof, stain resistant, self-deodorizing fabric. Hemmed edges and aluminum grommets on 6" centers at top edge.
 3. Sizes: as noted on drawings.
 4. Hooks: Bradley #9540 – Stainless steel spring wire clip with snap fastener, with 5 nickel plated brass rollers on each hook. Suitable for use with 1" and 1-1/4" shower curtain rods.
- G. Waste Receptacle:
1. Basis-of-Design Manufacturer: Bradley Surface Mounted Waste Receptacle
 2. Model #:
 - a. #357 for 6.5 Gallons or approved equal
 - b. #355 for 20.6 Gallons or approved equal
 - c. Locations as noted on drawings.
 3. Material and Finish: Architectural Satin finish Stainless Steel. Seamless welded construction. Secured to wall through rear mounting holes.
- H. Feminine Product Dispenser:
1. Basis of Design Product: Bobrick Contura Series #B-47069C or approved equal
 2. Size: 14-3/8"W x 28-3/8"H
 3. Type 304 Stainless Steel skirt for surface mounting.
 4. Free vending push button operation (less than 5lbs of force, no grasping, pinching, or twisting of the wrist.)
- I. Toilet Seat Cover Dispenser
1. Basis of Design Product: Bobrick Surface Mounted Seat Cover Dispenser
 2. Model #: B-221 or approved equal
 3. Finish: Satin Stainless Steel
- J. Framed Mirror:
1. Basis-of-Design Product: Bobrick Model # B-290-2436 or approved equal
 2. Mounting and Size: Surface mounted. Mirror with welded, seamless satin stainless steel angle frame, with concealed screw mounting and hanging bracket, size 24 x 36 unless noted otherwise on drawings.
- K. Grab Bar:
1. Basis-of-Design Manufacturer: Bobrick, or approved equal.
 2. Mounting: Flanges with concealed fasteners.
 3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant (preened grip) texture in grip area.
 4. Outside Diameter: 1-1/4 inches (32 mm).

5. Configuration and Length:

- a. Vertical at 18 inch lengths - Model # B-6806.99 x 18” or approved equal
- b. Horizontal at 24 inch lengths - Model # B-6806.99 x 24” or approved equal
- c. Horizontal at 36 inch lengths - Model # B-6806.99 x 36” or approved equal
- d. Horizontal at 42 inch lengths - B-6806.99 x 42” or approved equal
- e. Horizontal at 54 inch lengths - B-6806.99 x 54” or approved equal
- f. Corner Grab Bar: B-6861.99 or approved equal

L. Sanitary Napkin Disposal:

1. Basis-of-Design Manufacturer: Bobrick.
2. Mounting: Surface mounted sanitary napkin disposal unites. Type 304, 22 gauge stainless steel with all welded construction. Hinged cover are Type 304, 22 gauge stain. Secured to container with full-length stainless steel piano-hinge. All exposed surfaces shall have satin finish.
3. Model Type: Contura Series Bobrick B-270 or approved equal

M. Shelf with Mop and Broom Holders and Rag Hooks: Bobrick Model # B-224 x 36” or approved equal

N. Single Robe Hook: Surface Mounted, 2” x 2” square by 2” projection satin stainless steel with concealed mounting bracket. Bobrick Model # B-6717 or approved equal.

O. Wall Splash Guard for handryer

1. Stainless steel Type 304 finish
2. Dimensions: 32”H x16”W

1.4 FABRICATION

A. General: One, maximum 1-1/2-inch diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.

D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.

E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

1.5 UNDERLAVATORY GUARDS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Plumberex Specialty Products, Inc.
 2. TCI Products
 3. Truebro Inc.
- B. Underlavatory Guard:
 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 2. Material and Finish: Antimicrobial, molded plastic, white

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. AEC
- D. Epinephrine Cabinet
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 211200 - Fire-Suppression Standpipes: Valve cabinet enclosure for standpipes. and blankets

1.03 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers 2017, with Errata (2018).
- B. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

- A. Product Data: Provide extinguisher ratings and classifications.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers, Fire Extinguisher Cabinets and Accessories:
 - 1. JL Industries, Inc: www.jlindustries.com.
 - 2. Larsen's Manufacturing Co: www.larsensmfg.com.
 - 3. Potter-Roemer: www.potterroemer.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Dry Chemical Type Fire Extinguishers: Cast steel tank, with pressure gage.
 - 1. Type: 2A:10B:C.
 - 2. Class: A,B & C.
 - 3. Size: 5 pound multi-purpose.
 - 4. Finish: Baked enamel, color as selected.

5. Location: Storage Buildings, and as shown on drawings.

- C. K Type Extinguisher: Provide Wet Chemical (WC- 6L) Class K fire extinguishers with standard bracket in concession. (Maximum travel distance from cooking fire hazard to extinguisher = 30')
1. Type 2A:K
 2. 6 liters
 - a. Provide three (3) K Type Extinguishers (minimum).
 - b. Approved manufacturers: JL Industries, Larsen's, or Elkhart.

2.03 FIRE EXTINGUISHER CABINETS (FEC)

- A. Metal: Formed primed steel sheet.
- B. Cabinet Configuration: Basis of design Larsen architectural series. Manufacturers offering cabinets that may meet the basis of design specification and design intent include, but are not limited to:
JL Industries or approved equal
Safety one or approved equal
1. For mounting in CMU walls: Provide Semi-Recessed cabinet.
 - 1) Basis of Design: JL Industries Cosmopolitan Series Stainless Steel
 - 2) Internal Dimensions: 24" H x 10 1/2" W x 6" D
 - 3) Rough Opening Dimensions: N/A
 2. Trim: 2 1/2" Backbend
 3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- C. Door: 1/2 inch thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with continuous piano hinge.
- D. Door Style and lock: Recess mounted, vertical duo style, 18 gauge pressed steel construction with Duo-Panel doors and emergency safety locks (such as Larsen-Loc/Saf-T-lok).
- E. Verify that cabinets are sized to accommodate extinguishers.
- F. Door Glazing: Clear tempered safety glass, 1/8 inch thick, and set in resilient channel glazing gasket.
- G. Lettering: Vertical, die cut, white.
- H. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- I. Fabrication: Weld, fill, and grind components smooth.
- J. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.
- K. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Cabinet Signage: 3-D Fire Extinguisher Rigid Plastic Angle Sign – #PTD182..

2.05 ADDITIONAL EQUIPMENT

- A. Provide 4 Dry Chemical Type fire extinguishers and cabinets in addition to those shown on contract documents.

2.06 OTHER EQUIPMENT

- A. AED Cabinets: Philips Model PFE7023D.
1. Semi-Recessed with Audible Alarm and Strobe Light

2. Provide 3D wall sign, MacGill item 12325 or equivalent
 3. Quantity: 4
 4. Locations: TBD by Owner.
 5. Other approved manufacturers/products: Activar 1417F12FX2 Semi-Recessed Cabinet with 3” Rolled Trim & Silkscreen AED Graphic
- B. Epinephrine Cabinet/AED Combo: same as AED cabinet.
1. Semi-Recessed with Audible Alarm and Strobe Light
 2. Provide 3D wall sign, AED /Epinephrine, MacGill item 16285 or equivalent
 3. Quantity: 2.
 4. Locations: TBD by Owner.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

END OF SECTION

SECTION 10 51 00 - METAL LOCKERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Metal bases, tops, filler panels, and related components.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete base construction.
- B. Section 06 10 00 - Rough Carpentry: Wood blocking and nailers.

1.03 REFERENCE STANDARDS

- A. ASTM A 1008 - Standard Specification for Steel Sheet, Carbon, Cold-Rolled, Commercial Quality.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
- B. Shop Drawings: Indicate locker plan layout and numbering plan.
- C. Samples: Submit two samples 12 by 12 inches in size, of each color scheduled.
- D. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Lockers:
 - 1. List Industries: www.listindustries.com
 - 2. ASI Lockers: www.asilockers.com
 - 3. Lyon Workspace Products: www.lyonworkspace.com.
 - 4. Penco Products, Inc: www.pencoproducts.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Where basis of design is identified, products meeting the basis of design specifications and design intent may be available from listed manufacturers

2.02 LOCKER UNITS

- A. Types:
 - 1. Type A: Single Tier Open, 24"x18"x72" Basis of design list industries "SUPERIOR ALL-STAR OPEN FRONT FULLY-FRAMED ALL-WELDED ATHLETIC SPORT LOCKERS".
 - 2. Team and varsity locker rooms
 - a. Lower seat/foot locker
 - 1) 14 gauge sheet steel, Security Plus ventilated front panel

- b. Upper 12” Wide Security Box
 - 1) 14 gauge cold rolled sheet steel and securely MIG welded in place. The Door to be 14 gauge cold rolled sheet steel with plain (non-ventilated) door. Two heavy-duty 13 gauge 7-knuckle 3-1/2" hinges are to be MIG welded to the door and riveted to the side of the security box. Door to have a projecting friction catch, finger pull padlock hasp. Padlock Strike Plates
- c. Furnish each locker with one galvanized hat shelf, two single prong hooks at back of underside of shelf and one 1” O.D. stainless steel tube coat rod factory attached below upper hat shelf.
- d. Hat shelf
 - 1) 16 gauge galvanized sheet steel, have double bends at front and shall engage slots in the Hollow "T" vertical frame members at all four corners and be securely welded to the frame and side.
- e. Install on concrete pad.
- 3. Type B: Double tier 12”x12”x72” with door, Basis of design list industries
MARQUIS CHAMPION LOCKERS: Officials locker room
 - a. Integral Frame Locker Base 6”
 - 1) 14 gauge galvanized formed structural channels are MIG welded to the front and rear vertical side panel frame members to allow placement of locker bottom a minimum 2-3/4" above floor level. Locker bottom shelf located less than 2” above floor level will not be acceptable
 - b. Hinges:
 - 1) Not less than 3-1/2" long 13 gauge seven knuckle pin type, securely riveted to frame and welded to the door. Doors are to be secured to frame with a minimum of two tamper resistant rivets per hinge. Provide 3 hinges for doors 48" and higher and 2 for doors shorter than 48". All doors shall be right hand side hinged.
 - c. Latch Assembly
 - 1) single point rigid non-moving positive latch by means of a heavy gage (minimum 11 gage) latch securely welded to the framed vertical divider. The latch assembly must be made of a single piece of steel and have a padlock loop that inserts through the recess pan. The latch must be able to accept either a padlock or built-in combination lock. Rubber bumpers shall be securely riveted to the door strike.
 - d. one double prong ceiling hook and a minimum of two single prong hook
- B. Material: Mild cold rolled commercial quality steel, ASTM A1008, stretcher level, phosphatized; to the following minimum thicknesses:
- C. Sizes and Configurations: As noted on Drawings.
 - 1. Accessible Units: Five percent (5%) of units shall have shelf, hook, and latch in locations that comply with ADA reach range requirements.
- D. Finish: Steel surfaces shall be power washed, phosphate treated and finished with an electrostatically applied 2 mm thick hybrid epoxy/polyester powder coating and baked.
 - 1. Color as selected from manufacturers full standard range

2. Two-Tone Color Combination: Shall be at no additional cost with the locker body, frame and trim chosen from one color and the door and foot locker seat may be one of any other color chosen from manufacturers standard selection.
- E. Construction: Lockers shall be built on a unitized principle with common intermediate uprights separating units.
- F. All lockers shall be factory-assembled, of all MIG welded construction, in multiple column units to meet job conditions. Assembly of locker bodies by means of bolts, screws, or rivets will not be permitted. Welding of knockdown locker construction is not acceptable. Grind exposed welds and metal edges flush and make safe to touch..
- G. Body:
 1. Frame/Vertical Side Panels
 - a. 13 gauge 1/2" flattened expanded metal framed by 16 gauge Hollow "T" tubular sections and channel frame members designed to enclose all four edges of the side panel with the entire assembly MIG welded to form a rigid frame for each locker. The channel frame members are welded to the front and rear vertical frame members to create an anchor bearing surface of 1-1/4 inches wide x the depth of the locker at each side panel. Note: Diamond perforated sheet steel or 3/4" expanded metal will NOT be accepted..
 2. Backs:
 - a. 18 gauge cold rolled sheet steel, be continuous to cover a multiple framed unit and be welded to each vertical side panel frame member
 3. Sloping Top:
 - a. 18 gauge sheet steel approximately 18 degrees pitch, in lengths as long as practical but not less than four lockers. To be installed in addition to the locker flat top with end closures for support. Finished to match lockers
 4. Filler and Trim:
 - a. 16 gauge sheet steel, factory fabricated and finished to match lockers.
 5. Finish end panels
 - a. "Boxed" type formed from 16 gauge cold rolled steel with 1" O.D. double bends on sides and a single bend at top and bottom with no exposed holes or bolts. If lockers have slope tops, end panels must be formed with slope at top to cover the ends of the slope tops. Finished to match lockers. Provide at all exposed ends.
- H. Door: Double Tier Lockers only
 - a. Fabricated from single sheet prime 14 gauge with single bends at top and bottom and double bends at the sides with a 3" wide 18 gauge full height channel door stiffener MIG welded to the hinge side of the door as well as to the top and bottom door return bends and spot welded to the inside of door face to form a rigid torque-free box reinforcement for the door. All doors shall be right hand side hinged. Wardrobe doors 20" high and over to be perforated with 5/8" x 1-1/2" diamonds.
- I. Number Plates: Each locker shall have a polished aluminum number plate riveted to door face. Form numbers of block font style with ADA designation, in contrasting color.

- J. Accessories
 - 1. Continuous sloped top with end fillers.
 - 2. Fabricate sloped metal tops, ends and closure pieces.
 - 3. Perforated end panels and filler strips.
- K. Finish: Paint locker units in colors to be selected from manufacturer's standard color selection.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.
- B. Verify bases and embedded anchors are properly sized.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on locker base. Minimum pull out force 100lbs.
- D. Bolt adjoining locker units together to provide rigid installation.
- E. Install end panels.
- F. Install accessories.
- G. Replace components that do not operate smoothly.

3.03 CLEANING

- A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 10 73 16.13
METAL CANOPIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Attached metal canopies.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- E. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.
- F. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- G. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- I. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- J. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2015.
- K. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.
- L. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- M. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- N. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- O. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2010.
- P. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- Q. ASTM E2950 - Standard Specification for Metal Canopy Systems; 2014.

- R. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2013a.
- S. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.
- T. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- U. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- V. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit product data sheets, including material descriptions and finishes, and preparation instructions and recommendations.
- C. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing profiles, sections of components, finishes, and fastening details.
- D. Design Data: Submit comprehensive structural analysis of design for the specified loads. Stamp and sign calculations by professional engineer.
- E. Designer's Qualification Statement.
- F. Manufacturer's Qualification Statement.
- G. Erector's Qualification Statement.
- H. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
 - 1. Comply with applicable code for submission of design calculations as required for acquiring permits.
 - 2. Cooperate with regulatory agency or authorities having jurisdiction (AHJ), and provide data as requested.
- B. Perform steel work in accordance with AISC 303.
 - 1. Maintain one copy on site.
- C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
 - 1. Not less than three years of documented experience.
- D. Erector Qualifications: Company specializing in performing the work of this section.
 - 1. Not less than three years of documented experience and approved by canopy manufacturer.
- E. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site ready for erection.

- B. Package using methods that prevent damage during shipping and storage on site.
- C. Store materials under cover and elevated above grade.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Metal Canopies: Correct defective work within a two year period after Date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's one year warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Canopies:
 - 1. Mapes Canopies: <https://mapescanopies.com>
 - 2. FenWall: www.fenwalls.com
 - 3. MASA Architectural Canopies: www.architecturalcanopies.com
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 METAL CANOPIES

- A. Shop Fabricated Steel Canopy
 - 1. Pre-engineered steel system complying with ASTM E2950.
- B. Configuration: Layout and dimensions, column layout, canopy clearance, fascia profile, and roof covering design as indicated on drawings.
 - 1. Installation: Cantilever-mounted to building structure with tension members.
 - 2. Structural Framing System: Aluminum.
 - 3. Covering Material: Aluminum.
 - 4. Drainage Concept: Water collected in decking conducted into perimeter gutters and discharged through downspouts.
- C. Performance Requirements:
 - 1. Design and fabricate metal canopy system to resist wind, snow, live, and seismic loads without failure, damage, or permanent deflection in accordance with ASCE 7:
 - a. Loads: As indicated on drawings.
 - 2. Thermal Movement: Design canopy system to accommodate thermal movement caused by ambient temperature range of 120 degrees F (49 degrees C) and surface temperature range of 180 degrees F (82 degrees C) without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects on assembly components.

2.03 COMPONENTS

- A. Structural Steel Framing:
 - 1. Columns: ASTM A500/A500M, Grade B, round or rectangular tubing, sized to suit project design load requirements.
 - 2. Base and Top Plates: ASTM A36/A36M, with pre-drilled bolt holes.
 - 3. Beams: Wide flange, ASTM A572/A572M Grade 50.
 - 4. Other Structural Steel Members: ASTM A36/A36M.
- B. Structural Aluminum Framing: Alloy and temper 6063-T5, 6063-T6, or 6061-T6.
 - 1. Extruded Shapes and Tubes: ASTM B221 (ASTM B221M).
 - 2. Sheet and Plate: Alloy 5052, 5005, or 6061-T651, ASTM B209/B209M.
- C. Covering:
 - 1. Aluminum Decking:

- a. Interlocking extruded aluminum decking modules.
 - 1) Roll-Formed Decking: ASTM B209/B209M, Alloy 5052, 5005, or 6061-T651.
- b. Decking Orientation: As indicated on drawings.
- 2. Overhang: As indicated on drawings.
- D. Exposed Gutters and Downspouts: Galvanized steel with baked enamel finish, color to match canopy covering, manufacturer's recommended size for canopy specified.

2.04 SHOP FABRICATION

- A. Provide a complete system ready for erection at project site.
- B. Shop fabricate to the greatest extent possible; disassemble if necessary for shipping.
- C. Weld steel members in accordance with AWS D1.1/D1.1M.
- D. Weld aluminum members in accordance with AWS D1.2/D1.2M.
- E. Fabricate connections for bolt, nut, and washer connectors.

2.05 FINISHES

- A. Structural Steel Framing:
 - 1. Shop Primer: Rust-inhibitive red oxide.
- B. Aluminum Framing and Decking:
 - 1. Pigmented Organic Coatings: AAMA 2603, polyester or acrylic baked enamel finish.
 - 2. Color: As indicated on the drawings.

2.06 ACCESSORIES

- A. Structural Bolts: ASTM F3125/F3125M, Grade A325, minimum 3/4 inch (19 mm) diameter.
- B. Trim, Closure Pieces, and Flashings: Same material, thickness and finish as sheet metal decking; factory-fabricated to required profiles.
- C. Grout: ASTM C1107/C1107M; non-shrinking; premixed compound consisting of non-metallic aggregate, cement, water-reducing and plasticizing agents.
- D. Fasteners, Non-Structural: ASTM F593 stainless steel or ASTM A307 carbon steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and site area for conditions that might prevent satisfactory installation.
- B. Verify that foundation, electrical utilities, and placed anchors are in correct position.
- C. Verify that bearing surfaces are ready to receive this work.
- D. Do not proceed with installation until all conditions are satisfactory.

3.02 INSTALLATION - FRAMING

- A. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation.
- B. Set column base plates with non-shrink grout to achieve full plate bearing.
- C. Fasten columns to anchor bolts.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 INSTALLATION - CANOPY COVERING

- A. Install in accordance with manufacturer's instructions.
- B. Fasten metal decking to metal support members, aligned level and plumb.
- C. Install fascia panels, trim, and flashing.
- D. Separate dissimilar metals using concealed bituminous paint.

- E. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.04 CLEANING

- A. Clean surfaces of dust and debris; follow manufacturer's cleaning instructions for the finish used.

3.05 PROTECTION

- A. Protect canopy after installation to prevent damage due to other work until Date of Substantial Completion.

END OF SECTION 10 73 16.13

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**SECTION 11 68 34
ATHLETIC FIELD
EQUIPMENT**

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. General Conditions, Special Conditions and section "Scope of Work" are a part of and govern work under this section.
- B. Jump pit drain and infill material
 - a. Section 31 2000 - Earth Moving.
- C. Paving:
 - a. Section 32 1216 – Asphalt Paving
 - b. Section 32 1313 – Concrete Paving
- D. Synthetic running surface
 - a. Section 32 1824 – Synthetic Running Track Surfacing.
- E. Grass, Synthetic turf carpet system, shock pad and aggregate base layer construction
 - a. Section 32 1800 – Synthetic Turf Shock Pad
 - b. Section 32 1813 – Synthetic Turf Carpet
 - c. Section 32 3114 – Subgrade and Stone Aggregate Drainage Layer
 - d. Section 32 9200 – Grass Athletic Field Construction

1.2 SUBMITTALS

- A. Shop Drawings: Submit to the Architect for approval. Drawings shall show the jointing and bonding, connections with other work, typical and special anchoring of the sections, dimensions and other necessary information. All equipment specified shall be permanently anchored in concrete as per manufacturer's instructions or as detailed.
- B. Product Data: Submit manufacturer's technical data and installation instructions.

1.3 GUARANTEE

- A. Contractor shall also guarantee the work of this section against defective materials and/or workmanship for a period of one (1) year from date of acceptance by the Owner.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. The following equipment shall be as manufactured by Aluminum Athletic Equipment Company, West Conshohocken, PA 19428, (1-800-523-5471), or approved equal, as Sports Edge, Troutman, NC (1-800-334-6057) or Sports Field Specialties, Delhi, NY (1-800-975-3343):

<u>Name</u>	<u>No .</u>	<u>Qty.</u>
(1) Goal Posts (8' offset)(Pair)	ASG-HS	1
(2) Vault Box	SSVB	1
(3) Aluminum Shot Put Circle	SC	1
(4) Aluminum Shot Put Stopboard	ATB	1
(5) Aluminum Discus Circle	DC	1
(6) Discuss Cage	HSDC	1
(7) Bases (Set of 3)	M500	2
(8) Home Plate	BH88	2
(9) Pitching Rubber	BH81	2
(10) Soccer Goal (Pair)	SGR-P	3
(11) Field Hockey Goal (Pair)	FHG	2
(12) Lacrosse Goal (Pair)	LG	2
(13) Lacrosse Net (Individual)	LNP	4

PART 3 - EXECUTION

3.1 ERECTION

- A. All athletic equipment, and related items, shall be furnished and installed in accordance with the manufacturer's printed instructions, the specifications and as detailed. A letter to this effect shall be submitted by the Contractor to the Owner upon completion of the work.

NEW CASTLE COUNTY VOCATIONAL -
TECHNICAL SCHOOL DISTRICT

PAUL M. HODGSON VOCATIONAL
TECHNICAL HIGH SCHOOL

- B. Upon completion, clean all exposed surfaces and repair all defective joints as required; leave all work clean and free from surface dirt or imperfections. Protect all work of this section from all construction damage, during and after installation until acceptance by the Owner.

-- E N D --

SECTION 11 68 43 – EXTERIOR SCOREBOARDS
(SOFTBALL/BASEBALL SCOREBOARDS)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single-sided LED baseball scoreboard

1.02 REFERENCES

- A. Standard for Electric Signs, UL 48
- B. Standard for CSA C22.2 #207
- C. Federal Communications Commission Regulation Part 15
- D. National Electric Code

1.03 SUBMITTALS

- A. Product data: Submit manufacturer's product illustrations, data and literature that fully describe the scoreboards and accessories proposed for installation.
- B. Shop drawings: Submit mechanical and electrical drawings.
- C. Maintenance data: Submit manufacturer's installation, operation, and maintenance manuals.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Product delivered on site
- B. Scoreboard and equipment to be housed in a clean, dry environment

1.05 PROJECT CONDITIONS

- A. Environmental limitations: Do not install scoreboard equipment until mounting structure is secure and concrete has ample time to cure.
- B. Field measurements: Verify position and elevation of structure and its layout for scoreboard equipment. Verify dimensions by field measurements.
- C. Verify mounting structure is capable of supporting the scoreboard's weight and windload in addition to the auxiliary equipment.
- D. Installation may proceed within acceptable weather conditions.

1.06 QUALITY ASSURANCE

- A. For outdoor use
- B. Source Limitations: Obtain each type of scoring or related equipment through one source from a single manufacturer.
- C. ETL listed to UL 48
- D. NEC compliant
- E. FCC compliant
- F. ETLC listed to CSA 22.2 #207

1.07 WARRANTY

- A. Provide 5 years of no cost parts exchange including standard shipping on electronics parts and radios due to manufacturing defects
- B. Provide toll-free service coordination
- C. Provide technical online and phone support during Daktronics business hours

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Daktronics, Inc. <https://www.daktronics.com/>
- B. All American Scoreboards. <https://allamericanscoreboards.com>
- C. NEVCO. <https://www.nevco.com/>
- D. VARSITY Scoreboards. <https://varsityscoreboards.com/scoreboards/>

2.02 PRODUCT

- A. Basis of Design: Daktronics BA-2030 single-sided baseball scoreboard displays HOME and GUEST team scores for up to nine innings, total RUNS to 99 for each team, BALL to three, STRIKE to two and OUT to two or approved equal.
- B. Substitutions: See Section 016000 - Product Requirements.

2.03 SCOREBOARD

- A. General information
 - 1. Dimensions: 6'-6" (1.98 m) high, 20'-0" (6.10 m) wide, 0'-8" (203 mm) deep
 - 2. Base weight: 600 lb (272 kg) with vinyl captions – options may increase weight
 - 3. Base power requirement: 230 W (red/amber digits), 500 W (white digits) with vinyl captions – options may increase wattage
 - 4. Color: choose from manufacturer's standard paint selections
- B. Construction
 - 1. Alcoa aluminum alloy 5052 for excellent corrosion resistance
 - 2. Scoreboard back, face, and perimeter: 0.063" (1.60 mm) thick
 - 3. Scoreboard top and bottom: 0.125" (3.18 mm) thick
- C. Digits
 - LED color: **Amber**
 - 1. BALL, STRIKE, and OUT digits: 18" (457 mm) high
 - 2. Inning scores and RUNS digits: 15" (381 mm) high
 - 3. Seven bar segments per digit
 - 4. PanaView® LED digit technology
 - 5. All digits are sealed front and back with weather-tight silicone gel
- D. Captions
 - 1. Vinyl applied directly to scoreboard face
 - 2. HOME and GUEST captions: 12" (305 mm) high
 - 3. BALL, STRIKE, and OUT captions: 10" (254 mm) high
 - 4. Inning numbers and RUNS captions: 8" (203 mm) high
 - 5. Color: standard white or choose from manufacturer's vinyl color selections
- E. Border Striping
 - 1. Vinyl striping applied around the scoreboard face
 - 2. Color: standard white or choose from manufacturer's vinyl color selections

2.04 SCORING CONSOLE

- A. Console is an All Sport® 5000 controller
- B. Scores multiple sports using changeable keyboard inserts
- C. Controls multiple scoreboards and displays, including other All Sport 5000 controlled displays currently owned by customer
- D. Recalls clock, score, and period information if power is lost
- E. Runs Time of Day and Segment Timer modes
- F. Console includes:

1. Rugged aluminum enclosure to house electronics
 2. Sealed membrane water-resistant keyboard
 3. 32-character LCD to verify entries and recall information currently displayed
 4. Power cord that plugs into a standard grounded outlet; 6 watts max
 5. Control cable to connect to the control receptacle junction box (wired system only)
 6. Hand-held switch for main clock start/stop and horn
 7. Soft-sided carrying case
- G. Accessory Equipment

1. 2.4 GHz spread spectrum radio system with frequency hopping technology and 64 non-interfering channels; system includes a transmitter installed inside the console and a receiver installed inside the scoreboard(s)
2. Hard carrying case
3. Battery pack
4. Ad Panels

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting structure is ready to receive scoreboard. Verify that placement of conduit and junction boxes are as specified and indicated in plans and shop drawings. Verify concrete has cured adequately according to specifications.

3.02 INSTALLATION

- A. All power and control cables to scoreboards and displays will be routed in conduit. Power to the scoreboards/displays as well as raceways shown on electrical plans by the Electrical Contractor. Scoreboard control wiring including conduit will be the responsibility of the contractor assigned the scoreboard equipment.
- B. Install scoreboards and exterior displays to beams in location detailed and in accordance with manufacturer's instructions. Verify unit is plumb and level.

3.03 INSTALLATION—CONTROL CENTER

- A. Provide boxes, cover plates and jacks in locations per plans.
- B. Test connect control unit to all jacks and check for proper operation of control unit, scoreboard and all features. Leave control unit in carrying case and other loose accessories with owner's designated representative.
- C. Verify earth ground does not exceed 15 ohms.

END OF SECTION

SECTION 11 68 44 – EXTERIOR SCOREBOARDS
(FOOTBALL / TRACK)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single-sided LED football/track scoreboard

1.02 REFERENCES

- A. Standard for Electric Signs, UL 48
- B. Standard for CSA C22.2 #207
- C. Federal Communications Commission Regulation Part 15
- D. National Electric Code

1.03 SUBMITTALS

- A. Product data: Submit manufacturer's product illustrations, data and literature that fully describe the scoreboards and accessories proposed for installation.
- B. Shop drawings: Submit mechanical and electrical drawings.
- C. Maintenance data: Submit manufacturer's installation, operation, and maintenance manuals.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Product delivered on site
- B. Scoreboard and equipment to be housed in a clean, dry environment

1.05 PROJECT CONDITIONS

- A. Environmental limitations: Do not install scoreboard equipment until mounting structure is secure and concrete has ample time to cure.
- B. Field measurements: Verify position and elevation of structure and its layout for scoreboard equipment. Verify dimensions by field measurements.
- C. Verify mounting structure is capable of supporting the scoreboard's weight and windload in addition to the auxiliary equipment.
- D. Installation may proceed within acceptable weather conditions.

1.06 QUALITY ASSURANCE

- A. For outdoor use
- B. Source Limitations: Obtain each type of scoring or related equipment through one source from a single manufacturer.
- C. ETL listed to UL 48
- D. NEC compliant
- E. FCC compliant
- F. ETLC listed to CSA 22.2 #207

1.07 WARRANTY

- A. Provide 5 years of no cost parts exchange including standard shipping on electronics parts and radios due to manufacturing defects
- B. Provide toll-free service coordination
- C. Provide technical online and phone support during Daktronics business hours

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Daktronics, Inc., 201 Daktronics Drive, P.O. Box 5128, Brookings, SD 57006-5128
- B. All American Scoreboards. <https://allamericanscoreboards.com>
- C. NEVCO. <https://www.nevco.com/>
- D. VARSITY Scoreboards. <https://varsityscoreboards.com/scoreboards/>

2.02 PRODUCT

- A. Basis of Design: Daktronics FB-2023 single-sided football/track scoreboard displays period time to 99:59, HOME and GUEST scores to 99, DOWN/TO GO/BALL ON/QTR (quarter) information, and T.O.L. (time outs left) to nine. Track running time displays to 99:59.9, while lead split and finish times display to 99:59.99. Arrows indicate possession. Scoreboard comes standard with track captions on changeable panels. During the last minute of the period, the clock displays time to 1/10 of a second.
- B. Substitutions: See Section 016000 - Product Requirements.

2.03 SCOREBOARD

- A. General information
 - 1. Dimensions: 8'-0" (2.44 m) high, 25'-0" (7.62 m) wide, 0'-8" (203 mm) deep
 - 2. Base weight: 820 lb (372 kg) with vinyl captions – options may increase weight
 - 3. Base power requirement: 340 W (red/amber digits), 710 W (white digits) with vinyl captions – options may increase wattage
 - 4. Color: choose from manufacturer's standard paint selections
- B. Construction
 - 1. Alcoa aluminum alloy 5052 for excellent corrosion resistance
 - 2. Scoreboard back, face, and perimeter: 0.063" (1.60 mm) thick
 - 3. Scoreboard top and bottom: 0.125" (3.18 mm) thick
- C. Digits & Indicators
 - LED color **Amber**.
 - 1. Clock digits: 30" (762 mm) high
 - 2. HOME, GUEST, DOWN, TO GO, BALL ON, and QTR digits: 24" (610 mm) high
 - 3. T.O.L. digits: 18" (457 mm) high
 - 4. Seven bar segments per digit
 - 5. PanaView® LED digit technology
 - 6. All digits and indicators are sealed front and back with weather-tight silicone gel
- D. Captions
 - 1. Vinyl applied directly to scoreboard face; track captions are on changeable panels
 - 2. HOME and GUEST captions: 15" (381 mm) high
 - 3. DOWN, TO GO, BALL ON, QTR, T.O.L., and track captions: 12" (305 mm) high
 - 4. Color: standard white or choose from manufacturer's vinyl color selections
- E. Border Striping
 - 1. Vinyl striping applied around the scoreboard face and clock digits
 - 2. Color: standard white or choose from manufacturer's vinyl color selections
- F. Accessory Equipment
 - [Custom vinyl team name caption in place of HOME]**
 - *or***
 - [Two Programmable Team Name Message Centers (TNMCs) in place of vinyl HOME and GUEST captions – add 120 lb (54 kg) and 100 W (230 W for white)]**

or

[Two Backlit Team Name Captions in place of vinyl HOME and GUEST captions – add 64 lb (29 kg) and 70 W]

1. **[Electronic Captions in place of vinyl DOWN/TO GO/BALL ON/QTR captions – add 160 lbs (73 kg) and 180 W (360 for white); T.O.L. caption will be backlit]**

or

[Backlit Captions in place of vinyl DOWN/TO GO/BALL ON/QTR/T.O.L. captions – add 80 lbs (36 kg) and 140 W]

2. **[Soccer captions on changeable panels]**
3. **[Lacrosse/field hockey captions on changeable panels]**
4. **[Horn]**
5. **[Individual digit protective screens] [Protective netting]**
6. **(2) Ad Panels – top and bottom**

2.04 SCORING CONSOLE

- A. Console is an All Sport® 5000 controller
- B. Scores multiple sports using changeable keyboard inserts
- C. Controls multiple scoreboards and displays, including other All Sport 5000 controlled displays currently owned by customer
- D. Recalls clock, score, and period information if power is lost
- E. Console capable of automatically calculating and displaying DOWN & TO GO for each play
- F. Runs Time of Day and Segment Timer modes
- G. Console includes:
 1. Rugged aluminum enclosure to house electronics
 2. Sealed membrane water-resistant keyboard
 3. 32-character LCD to verify entries and recall information currently displayed
 4. Power cord that plugs into a standard grounded outlet; 6 watts max
 5. Control cable to connect to the control receptacle junction box (wired system only)
 6. Hand-held switch for main clock start/stop and horn
 7. Soft-sided carrying case
- H. Accessory Equipment
 1. 2.4 GHz spread spectrum radio system with frequency hopping technology and 64 non-interfering channels; system includes a transmitter installed inside the console and a receiver installed inside the scoreboard(s)
 1. Hard carrying case
 2. Battery pack

I. EXECUTION

2.05 EXAMINATION

- A. Verify that mounting structure is ready to receive scoreboard. Verify that placement of conduit and junction boxes are as specified and indicated in plans and shop drawings. Verify concrete has cured adequately according to specifications.

2.06 INSTALLATION

- A. All power and control cables to scoreboards and displays will be routed in conduit. Power to the scoreboards/displays as well as raceways shown on electrical plans by the Electrical Contractor. Scoreboard control wiring including conduit will be the responsibility of the contractor assigned the scoreboard equipment.

- B. Install scoreboards and exterior displays to beams in location detailed and in accordance with manufacturer's instructions. Verify unit is plumb and level.

2.07 INSTALLATION—CONTROL CENTER

- A. Provide boxes, cover plates and jacks in locations per plans.
- B. Test connect control unit to all jacks and check for proper operation of control unit, scoreboard and all features. Leave control unit in carrying case and other loose accessories with owner's designated representative.
- C. Verify earth ground does not exceed 15 ohms.

END OF SECTION

SECTION 12 36 00
COUNTERTOPS, BACKSPLASHES AND WINDOW STOOLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall-hung counters and tops.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2022.
- B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- C. PS 1 - Structural Plywood; 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- G. Installation Instructions: Manufacturer's installation instructions and recommendations.
- H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Stainless Steel Countertops: Type 304, stainless steel sheet; 16 gauge, 0.0625 inch (1.59 mm) nominal sheet thickness.
 - 1. Finish: 4B satin brushed finish.
 - 2. Exposed Edge Shape: Marine edge with return; edge raised 3/16 inch (5 mm) above counter with 45 degree transition, minimum 1 inch (25 mm) flat rim; 1-1/2 inch (38 mm) high turndown, 1/2 inch (12 mm) return to face of case; reinforced with hardwood or steel.
 - 3. Back and End Splashes: Same material; welded 1/4 inch (6 mm) radius coved joint to countertop; square top edge with 1 inch (25 mm) wide top surface and minimum 1/2 inch (12 mm) turndown.
 - 4. Splash Dimensions: 4 inch (100 mm) high by 1 inch (25 mm) thick, unless otherwise indicated.

2.02 MATERIALS

- A. Wood-Based Components:
 - 1. Wood fabricated from old growth timber is not permitted.
 - 2. Provide sustainably harvested wood, certified or labeled; see Section 01 60 00 - Product Requirements.
- B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- C. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf (20 kg/cu m) minimum density; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- E. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 ACCESSORIES

- A. Fixed Top-Mounted Countertop Support Brackets:
 - 1. Material: Steel.
 - 2. Finish: Manufacturer's standard, factory-applied, textured powder coat.
 - 3. Color: Black.
 - 4. Products:
 - a. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch (25 mm) except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 - 2. Height: 4 inches (102 mm), unless otherwise indicated.

- C. Stainless Steel: Fabricate tops up to 144 inches (3,657 mm) long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
 - 1. Mechanical joints: C-bolt seam, or male-female bolted connections, tightly fitted. Locate any required joints minimum 2 feet from sinks.
 - 2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where indicated on drawings.
 - 3. Provide wall clips for support of back/end splash turndowns.
 - 4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
 - 5. Integral sinks: Fabricate with corners rounded and coved, double-walls for sink compartment partitions. Factory-punch holes for fittings, and weld sinks to countertops.
- D. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach stainless steel countertops using stainless steel fasteners and clips.
- C. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.
- B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.
- C. Field Joints: 1/8 inch (3 mm) wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 12 36 00

SECTION 12 93 00 - SITE FURNISHINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Bicycle racks.
- B. Removable bollards.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Mounting surface for bicycle racks.
- B. REFERENCE STANDARDS
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle racks with sufficient care to prevent scratches and other damage to the finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Outdoor Bicycle Racks
 - 1. Victory Stanly Products <https://www.victorystanley.com>
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 BICYCLE RACKS

- A. Outdoor Bicycle Racks
 - 1. Product Victory Stanley BRCS-109.
 - 2. Description: Nine loop bike rack 11 bike capacity
 - a. 2.375 O.D. tubular steel
 - b. Provide quantity of 3 to be field located.
 - 3. Mounting, Ground: In-ground anchor.
 - 4. Finish: Powder coat, maintenance-free and weather-resistant.
 - 5. Color: As selected by Architect from manufacturer's complete range.
 - 6. Accessories: In-ground grout cover.
- B. Materials

1. Pipe: Carbon steel, ASTM A53/A53M, Schedule 40.
2. Tube: Carbon steel, ASTM A500/A500M.
3. Bar, Round and Flat, Carbon Steel: ASTM A36/A36M.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive site accessories.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Do not begin installation until unsatisfactory substrates have been properly repaired.

3.02 PREPARATION

- A. Ensure surfaces to receive site accessories are clean, flat, and level.

3.03 INSTALLATION - BICYCLE RACKS

- A. Install in accordance with manufacturer's instructions.
- B. Install bicycle racks level, plumb, square, and correctly located as indicated on drawings.
- C. In-Ground Anchor Installation:
 1. Prepare holes in size according to manufacturer's instructions.
 2. Place anchoring bolts through the holes in the pipe.
 3. Lower rack into holes, ensuring the bottom of lower bends are at least 1-1/2 inch from the ground.
 4. Pour concrete and level rack.
 5. Support until dry.

3.04 INSTALLATION - BOLLARDS

- A. Install in accordance with manufacturer's instructions.
- B. Install bollards plumb.
- C. Embed sockets for removable bollards securely in concrete.

3.05 CLEANING

- A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 13 12 50 - GRANDSTANDS AND PRESS BOX

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide outdoor permanent grandstands and press boxes as detailed in these performance specifications. Drawings required with bid for clarification of design intent.
- B. Provide necessary engineering, material, freight, installation and supervision to provide grandstand seating systems in accordance with the following performance criteria.

1.02 PERFORMANCE CRITERIA

- A. The minimum acceptable standards of design are:
 - 1. Grandstand Design to match schematic layouts. Front Walkway to be 6'-2" deep. Overall length per plans. Grandstand is a clear span I-beam substructure designed for L/200.
 - 2. Decking System - Tread depth and riser heights to be per schematic layouts
 - i. Interlock decking system with secondary gutter system. Home side grandstand
 - ii. Tongue and groove semi-closed deck with angle closures. Visitor grandstand
 - 3. Aisle layout is per schematic plans. There shall be center aisle rails or end aisle rails per code.
 - 4. Handicap seating areas per schematic plans and in accordance with local, state and national guidelines.
 - 5. Finishes to be "hot dipped" galvanized on the steel understructure, clear anodized on the seat boards. Riser boards to be Dur-Kyn painted finish from standards. Black painted aluminum aisle nosing strips at aisles and stairs risers. Perimeter steel railing risers to be hot dipped galvanized, horizontal pipe rails to be clear anodized and utilizes 6 ga. black vinyl chain link fencing with a 2" mesh pattern.
 - 6. Aluminum footboards added to the standard mill finish is an applied Premium traction coating system. Provide a premium traction finish that achieves a "high traction" rating as defined by the ANSI/NFSI B 101.1 standards with a minimum of .80 slip co-efficiency rating. The premium traction system must be verified, tested, and proven. Finishes must prevent any surface oxidation staining. Required on grandstand footboards, stairs, and ramps.
 - 7. Front façade on both the home side and visitor stands are dur-kyn high performance painted finish aluminum riser boards with concealed fasteners.
- B. Signage
 - 1. Properly label all handicap seating areas
- C. Press Box – Type II construction
 - 1. Press box to be constructed of steel framing.
 - 2. Viewing glass per plans.
 - 3. Full length rooftop filming platform.
 - a) Home side stand to have an exterior rear stair access to rooftop filming platform.
 - b) Home side stand to have a steel framed roof system covering the entire width and depth of the platform.

4. Interior finishes shall be as listed on the plans without deviations.
- D. An AISC certified steel fabricating plant is a requirement of this project for quality control and assurances. See Section Quality Assurance, C.
- E. Stairs and ramps per plans and in accordance with State and Local codes and guidelines.

1.03 RELATED WORK/ RELATED SECTION

- A. In accordance with plans and specifications:
 1. Demolition of existing if required
 2. Concrete Foundations/Pads
 3. Main electrical feed and final hook-up to press box
 4. Press box Sound System
 5. Surveying, site preparation and final grading
 6. Access to the site for installation equipment and staging.

1.04 QUALITY ASSURANCE

- A. Manufacturers Qualifications:
 1. Manufacturers must have a minimum of ten years of experience in the manufacturing of grandstands and press boxes under current company name.
 2. Manufacturer must provide five references of similar projects within the State of Delaware. References shall include scope of work, contract amount, owner's name and phone numbers, contract completion date and actual completion date.
- B. Welders must be AWS certified; manufacturing capabilities in accordance with the governmental agencies having jurisdiction.
- C. Steel fabrication to be done in an AISC certified plant or in compliance with IBC Chapter 17. A third party AISC approved inspection agency must be hired to complete and properly document these inspections. The agency must disclose any possible conflicts of interest so that objectivity can be confirmed. Certified reports shall be submitted directly to the architect for confirmation. All associated costs shall be inclusive with the manufacturers bid.
- D. Installers Qualifications:
 1. Factory-trained and experienced in the installation of grandstands.
 2. Source Quality Control: Mill Test Certification.
 3. Single Source Responsibility: Obtain all of each distinct material required from a single manufacturer.
- E. Code Compliance: Provide aluminum bleachers to meet or exceed all State and Local applicable codes and in compliance with the International Building Code and the IBC/ICC National Code and CABO/ANSI A117.1 Barrier Free Sub code, Current Adopted Edition.

1.05 SUBMITTALS

- A. Product Data: Submit technical data for each distinct type of material, component and accessory indicated.
 1. Include information which specifically details physical properties and performance characteristics.
- B. Shop Drawings: Manufacturer to submit shop drawings. After award submittal drawings should be submitted with structural design calculations signed and sealed by a licensed

Professional engineer (state of project location), and schedules for type, location, quantity and details of all aluminum components required for this project.

1. Shop drawings to be in compliance with International Building Code and all other State and Local Codes and Regulations.
 2. Concrete designed per American Concrete Institute Guidelines
 3. Samples: Submit manufacturer's samples upon request.
- C. Certificate: Submit manufacturer's certification that materials furnished comply with requirements indicated and also in compliance with the International Building Code along with all other applicable Federal, State and local codes, and that materials meet or exceed test requirements indicated.

1.06 WARRANTY

- A. Submit a written warranty signed by the manufacturer, installer, and the contractor, guaranteeing to correct failures for a period of one (1) year after substantial completion, without reducing or otherwise limiting any other rights to correction which owner may have under the contract documents. Failures are defined to include faulty workmanship or faulty materials. Correction may include repair or replacement.

1.07 BUILDING CODES

- A. Comply with all applicable which includes but not limited to the following:
1. International Building Code- Current Edition
 2. AISC Manual of Steel Construction, 9th Edition
 3. Aluminum Association of America Guidelines
 4. International Building Code Guidelines for Accessibility, Current Edition
 5. American Concrete Institute
 6. COMcheck approval required for the Press box using the 2018 energy conservation code
- B. The bleacher shall be designed to support, in addition to its own weight, a uniformly distributed live load of not less than 100 pounds per square foot of gross horizontal projection of the bleacher. And 6 pounds per square foot of dead load on seats, footboards, risers and steel framing.
- C. All seat and footboard members shall be designed to support not less than 120 pounds per linear foot. The bleacher shall be designed to resist, with or without live load, horizontal wind load appropriate for local conditions. It shall also be designed to resist, in addition to the live load, sway forces applied to the seats in a direction parallel to the length of the seat planks 24 pounds per liner foot; and, in a direction perpendicular, stresses in aluminum members and connections shall not exceed those specified for Building Type Structures by the Aluminum Association.
- D. General: The structure shall be properly braced for wind and construction loads until all structural elements are secured. Lateral and longitudinal bays shall be cross-braced as required. Guardrails shall be of adequate size, location, and height to meet specified codes and designed to carry required loads. Exit stairs and intermediate aisle stairs shall be completely closed, in the direction of travel and shall have a maximum rise of 7” and a minimum tread of 11”.
- E. Code Compliance: Submittals shall be based upon specifications and drawings contained in the bid documents. Architect will not review any design or product changes prior to the bid date. Design changes to reduce overall aisle egress calculations or number of stair and ramp exits will not be allowed. All bidders must bid in accordance with these specifications.

1. The Bleacher Contractor shall be responsible to meet the code interpretation provided in the bid documents and modify as required by state or local governmental review boards.
2. Calculations that demonstrate code compliance with egress and exit of aisles, stairs, and ramps are a required submission with approved drawings.

1.08 MAINTENANCE

- A. Manufacturer's Recommendations:
 1. Owner conducts annual visual inspection and required maintenance of grandstand and press box to assure safe conditions.
 2. It is also recommended that a professional engineer, registered architect or certified grandstand representative performs inspections biennially.

PART 2 - PRODUCTS

2.01 PRODUCT MANUFACTURERS

- A. Basis of design is Southern Bleacher Company, Graham, TX. <https://www.southernbleacher.com/> or approved others.
- B. Products by other manufacturers that meet the basis of design specification and design intent may be provided including, but not limited to:
 - Sturdisteel. Waco, TX. <https://www.sturdisteel.com/>
 - GT Grandstands, Plant City, FL. <https://www.gtgrandstands.com/>
- D. Substitutions: See Section 016000 - Product Requirements.

2.02 GALVANIZED STEEL CLEAR SPAN I-BEAM GRANDSTAND - HOME STAND / LEG TRUSS SYSTEM – VISITOR STAND

- A. Product Description Home Side Interlock Decking System. Visitor stand is to be tongue and groove semi-closed decking with angle closures, per plans.
 1. The intent of the product design is to reduce and minimize the deflection of the aluminum deck and allow for future reconfiguration of seating as may be needed. All individual deck members shall be fitted together longitudinally at all tread, front walk and cross walk locations. This design, in ambient conditions, allows for expansion and contraction without damage or deformation of the aluminum deck. All deck members shall be secured with two hold down clips at each structural member.
 2. Galvanized steel elevated permanent I-Beam home grandstand home and leg truss, visitor
 3. Framing and spacing of all columns to follow the drawings. Cross bracing will be within every other bay starting with the end section.
 4. Front Walkway:
 - a. Depth of the front walkway, per plans is to be 6'-2" from front fence to first row.
 - 1) Grandstand: Elevated per plans.
 5. Entry stairs to be firmly anchored to uniformly poured concrete bases.
 - a. Stair rise: 7 inches (max) per Building Code with vertical aluminum closure.
 - b. Stair tread depth: 11 inches (min) per Building Code with contrasting extruded aluminum aisle nosing at leading edge of each tread.
 - c. Guardrails on Stair to be 42 inches above leading edge of step with two- line anodized aluminum rail and filled with 6-gauge black vinyl coated chain link fence (2" mesh).

- d. Stairs to have offset handrail extensions on each side of stair. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corner. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the nosing of treads and landings. Handrails shall be continuous the full length of the stairs and shall extend in the direction of the stair run not less than 12 inches beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals. Handrails shall be extruded anodized aluminum.
6. Aisles:
 - a. Aisles with seating on both sides to have 34-inch high handrail with intermediate rail at approximately 22 inches above tread. Aisles with seating on one side shall have 34-inch high handrail attached to guardrail system. Handrail shall be mounted to provide clearance from guardrail system in accordance with building code.
 - b. Pre-fabricated anodized aluminum handrails with continuous rounded ends are discontinuous to allow access to seating through a space 22 inches (min.) to 36 inches (max.).
 - 1) Handrails shall connect to decking / riser surface without penetration of the deck system. Any attachment which must have holes drilled through the decking or intermediate step members is not acceptable.
 - 2) If half steps are required, these steps shall be constructed of the same materials as the treads and risers of the grandstands. Ends shall be completely closed and attached with same mechanical fasteners as used for seat brackets. Extruded aluminum contrasting aisle nosing shall be mechanically fastened to the leading edge of each step.
 7. Aluminum Decking System:
 - a. Bleachers: rise per and tread depth per plans.
 - b. Each seat 17 inches above its respective tread.
 - c. Decking Arrangement interlock decking home grandstand - per section plans
 - d. The seats shall be 2 x 10 flat designed extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA-M10C22A31, Class II finish. Seats shall have serrations on top side to allow for safety of occupants.
 - e. The intent of the product design is to reduce deflection of aluminum deck and to minimize fluid drainage below spectator seating.
 - f. All individual deck members shall be locked together longitudinally at all treads, front walk and cross walk locations.
 - g. This design, in ambient conditions, allows for expansion and contraction without damage or deformation of the aluminum deck.
 - h. The locking design does not allow any fluids to pass to the ground under the spectator seating.
 - i. The system shall cause the deck planks to react together at all treads and cross walks to live load and form the appearance of a single tread system. By design, this system forms a solid, overlapping tread and riser installation.
 - j. The nose extrusion at aisles shall allow for a 1" extruded aluminum contrasting nose piece to be flush mounted on the leading edge and shall capture the vertical riser plank in an extruded pocket. The heel extrusion shall have a .70" vertical lip at the rear of the plank to allow for placement of vertical riser plank.
 - k. These extrusions shall be such that the attachment of the seat brackets, step brackets, mid-aisle rails and all other components is accomplished without deck penetrations at aisle locations.

- l. The system shall allow for seat and aisle reconfiguration at any time without evidence of its previous configuration.
 - m. A secondary gutter placed below footboard butt joints shall consist of doubling the stringers at these locations and placing a galvanized formed gutter between the stringers placed approximately 12” apart. The gutter starts at the top of the stand and terminates at a collector box just below row #1. Transferring the water from the collector box to the site drainage location will be the responsibility of the general contractor. Home stand only
 - n. Entry stairs to be a minimum 2 x 11 mill finish aluminum with inset extrusion to accept contrasting nosing member.
 - o. Ramp planks to be interlocking to resist deflection of live loads.
 - p. Open ends of planks to be covered with anodized aluminum end caps, securely fastened to the plank.
 - q. Joint sleeves: Dual joint sleeves to be inserted at each butt joint of each load bearing aluminum plank, and to penetrate 6 inches into each plank at the joint.
10. Guard railing: To be at all sides of bleacher, entry stairs, ramps portals and landings.
- a. Vertical rail risers to be galvanized steel angle 3” x 3” x ¼ (50 ksi) for steel to steel connection and fastened with 3/8” galvanized hardware
 - b. Horizontal railing to be anodized aluminum with aluminum cast end plugs at ends of straight runs and/or elbows at corners.
 - c. All guards shall be secured to vertical rail members with hot dipped galvanized fasteners and clamps
 - d. Railings shall be placed at a minimum of 42” above walkways, entrances and adjacent seat boards.
 - e. The barrier material shall include 6 - gauge black vinyl coated chain link fencing, fastened in place with hot dipped galvanized tension bars and aluminum ties.
11. Ramps:
- a. Slope: 1 in 12.
 - b. Guardrails to be 42 inches above ramp with two-line anodized aluminum rail and in filled with 6- gauge black vinyl coated chain link fence (2” mesh) and 2 x 6 extruded aluminum toe board.
 - c. Handrail: Ramps to have handrail extensions. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the ramp surface. Handrails shall be continuous the full length of the ramp and shall extend in the direction of the ramp not less than 12 inches beyond the end of the ramp. Ends shall be returned or shall terminate in newel posts or safety terminals. If returned, rail must be smooth with no external fittings.
 - d. Termination: Ramps shall end with smooth transition onto level concrete pad at benchmark elevation. Aluminum plate with end closures required.
12. Handicap provision:
- a. Quantity of wheelchair spaces: as shown on drawings and in full compliance with ADA Standards set forth in International Building Code Accessibility Regulations
 - b. Riser area adjacent to wheelchair spaces to have intermediate construction so 4-inch sphere cannot pass through opening.
 - c. Guardrail: Area directly behind handicap areas shall have two-line anodized aluminum rail attached to the riser members. These rails shall be pre-fabricated to

match the appearance of the mid-aisle handrails. A toe rail shall be attached to the base of the rail.

- B. Substructures:
 - 1. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
 - 2. Shop connections are seal welds.
 - 3. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications. Painted and/or powder coated steel does not offer proper protection and is not an acceptable protective finish for this project
 - 4. All hardware shall be hot-dipped galvanized to ASTM A-123, mechanically galvanized or aluminum (aluminum applies to pop rivets, drive rivets, wire ties).
 - 5. A minimum of 3/8” galvanized connection hardware to be used on the substructure
- C. Extruded Aluminum:
 - 1. Seat Planks and Railing are extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA-M10C22A31, Class II finish.
 - 2. Riser planks are extruded aluminum alloy, 6063-T6 with Dur-Kyn painted finish, per location on plans.
 - 3. Tread, stair and ramp planks are extruded aluminum alloy 6063-T6 mill finish
 - 4. Joint Sleeve Assembly to be inserted in flat plank to maintain true alignment in joining together two plank pieces. Extruded aluminum alloy, 6063-T, mill finish.
- D. Accessories:
 - 1. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II. Mechanically fastened.
 - 2. Cast End Plugs: Aluminum 319 alloy, cast finish. (Required at termination ends of railing)
 - 3. Hardware:
 - a. Bolts, Nuts: Hot-dipped galvanized or mechanically galvanized.
 - b. Hold-down Clip Assembly: Aluminum alloy 6005A-T6, mill finish.
 - c. Structural Hardware: Equal to or greater than hot dipped galvanized ASTM-A307. No connections utilizing high strength bolts are classed as slip critical.
 - d. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, slip-resistant black painted finish. Mechanically fastened.
 - e. Fabrication:
- E. Design Load:
 - 1. Live Load: 100 psf gross horizontal projection.
 - 2. Lateral Sway Load: 24 plf seat plank.
 - 3. Perpendicular Sway Load: 10 plf seat plank.
 - 4. Live Load of Seat and Tread Planks: 120 plf.
 - 5. Handrails and Guardrail: Designed to resist a single concentrated load of 200# applied in any direction at any point along the top. Per the International Building Code.
 - 6. Wind load: Per State and Local Building Code.
 - 7. Live load deflection of structural members shall be limited to L/200 of the span.
- F. All manufactured connections to be shop welded.
 - 1. Manufactured by certified welders conforming to AWS Standards.

2.03 PRESS BOX WITH STEEL FRAME CONSTRUCTION

- A. Product Description: Steel Frame Construction.

- B. Press box Dimensions: Home stand is (8) feet wide x (36) feet long – straight front design.
- C. Press box to be constructed with rear exterior stair access to filming platform for the home side.
- D. Special Inspections- third party inspection to be completed and documented at the fabrication facility in accordance with DE Regulations.
- E. Press Box Support Structure:
 - 1. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
 - 2. Shop connections are seal welds.
 - 3. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
- F. Press Box: All materials shall be new and shall comply with ASTM specifications.
 - 1. Floor
 - a. Main support to be a galvanized steel floor frame sized to support structure and metal belly pan for support of insulation.
 - b. Floor to be INTERLOCK Aluminum Decking System, extruded aluminum alloy 6063-T6. Attach Decking System to steel floor frame with mechanical fasteners at end of plank and at intermediate supports. Wood/plywood base decking has proven to deteriorate over time and is not an acceptable alternative.
 - c. Insulation: Kraft faced fiberglass building insulation thickness in compliance with 2015 energy conservation code. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal.
 - d. Wall Structure Steel Framing
 - 1) 4 inch x 4 inch x 11 gauge square tubing with maximum span of 14 feet on front wall and maximum span of 6 feet on back wall and 4 inch x 2 1/2 inch x 14 gauge steel "cees" with maximum spacing of 5 feet for all walls with siding. Spans greater than these require engineered calculations for design.
 - 2) Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal. Insulation shall be in accordance with the 2021 International Energy Conservation code.
 - 3) Interior Finish
 - (a) 1/2 inch vinyl coated gypsum panels, Gold Bond vinyl-surfaced
 - (b) Cove Base: Vinyl 4 inches x .080 color to be medium gray.
 - 4) Exterior Finish
 - (a) 26 - gauge prefinished R-Panel paneling as manufactured by MBCI, Signature 200 color series, color to be determined. Vinyl clad siding is not an acceptable product.
 - (b) Wall panels are attached with #12 TEK screws - 6" O.C. at the top and bottom of the panels. Lap screws are placed at each end of the panels, at the intermediate supports, and at the mid-point between supports (TEK #14). All fasteners to be painted same color as exterior paneling.
 - e. Roof Structure
 - 1) 4 inch x 4 inch x 11 gauge square tubing with maximum spacing of 6 feet on center and 4 inches x 2 1/2 inches x 14 gauge steel "cees" with maximum spacing of 2 feet on center.
 - 2) Roof: 1/8 inch four way steel plate roof, continuous welded seams coated with acrylic metal primer as manufactured by Coronado and 36 mils of acryl ink roof coating as manufactured by Isothermal Protective Coatings, or equal. Plate is

- welded on both sides of rafters with 1-1/2 inch long 1/8 inch fillet welds on 12 inch centers. Plywood sheathing will not be accepted.
- 3) Insulation: Kraft faced fiberglass building insulation, R-19 (minimum) 6 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp., or equal.
 - 4) Cornice: 26 gauge steel prefinished- color to be determined.
 - 5) Ceiling: 24 inch x 24 inch x 5/8 inch acoustical ceiling tile architectural revealed edge style wind clips and other components as manufactured by USG, or equal.
- f. Exterior Doors
- 1) Full flush steel construction with honeycomb core. 18 gauge skin sheets. Dimensions: 3 feet 0 inches x 6 feet 8 inches. Color: White.
 - 2) Steel door frame (16 gauge) complete with 1/2 inch threshold and weather-stripping.
 - 3) Exterior Hardware (Prior to completed fabrication check with the district to verify what core lock system they use): Yale 546F Exterior Trim, or equal. Handles shall be lever type that allows operation without tight grasping or twisting of the wrist. All exterior hardware must accommodate this.
 - 4) Interior Hardware: Yale 2100 Exit Device, or equal. Handle shall be panic bar that allows for opening without any grasping, twisting or turning.
 - 5) Interior Walls
 - (a) Framing to be steel galvanized studs (25 gauge) 1 1/4 inch x 3 5/8 inch at maximum 2 feet on center.
 - (b) Finishes to be consistent with all other interior finishes.
 - (c) A 24" x 56" interior window in each wall.
- g. Windows
- 1) Frame: Extruded aluminum single hung, horizontal sliding unit, thermal break.
 - 2) Sash: Tilt toward inside for easy cleaning.
 - 3) Glazing: Clear tempered panes.
 - 4) Dimensions of each unit: See Drawings. At interior wall locations or structural support locations the dimension between windows shall be no greater than 6 inches.
 - 5) Finish: Electrostatically applied acrylic enamel.
- h. Work Bench
- 1) 18 inch deep clear anodized aluminum countertop with a radius front edge.
 - 2) Support using 4" x 2" x 14 ga. Steel "cee" on 4" x 4" x 11 ga. Sq. tubing welded to steel.
 - 3) Shelf brackets do not provide proper support and are not acceptable.
- i. Painting: Materials equal to. Coronado or equal.
- 1) Surfaces: Exterior Door(s), Door Frame(s)
 - (a) Primer: Applied by Door Manufacturer.
 - (b) Finish: 2 coats acrylic latex semi-gloss enamel applied by press box manufacturer.
 - 2) Surfaces, Exterior Siding
 - (a) Primer: Applied by Siding Manufacturer.
 - (b) Finish: Applied by Siding Manufacturer.
 - (c) Touchup: If applicable
 - 3) Surfaces: Wall and Roof Structure
 - (a) Primer: Coronado DTM Industrial 180-11 acrylic metal primer applied after welding, or equal.

- j. Caulking: Sonneborn NP1 - Polyurethane sealant, All temperature, UV resistant, or equal. Silicone products are not acceptable.
- k. Electrical Work:
 - 1) Submittal drawing shall indicate devices and circuitry.
 - 2) Fixtures: Recessed Edge lit LED panel light fixture for use in grid ceiling systems.
 - 3) Wiring to be in nonmetallic Panduit, or equal. N.E.C. breaker box to be 200 amp service mounted on wall with 2 inch rigid conduit to be stubbed out at back wall of press box ready for service line to be connected.
 - 4) Service line to Press Box (By Electrical Contractor)
 - 5) Electrical outlet(s) installed per NEC shall be standard duty.
 - (a) All outlets shall be surface mounted on wall.
 - 6) Sound, Telephone, Clock, Field Communication: Empty double outlet boxes per N.E.C. with 3/4 inch conduit stubbed out bottom of Press Box. Electrical contractor is responsible for re-connecting all electric, telecommunications and audio visual wiring, conduit and equipment to the press box.
 - 7) Outlet boxes to be flush mounted into wall. Any wiring completed on-site will be responsibility of such contractor for inspections. Quantity per plans.
 - 8) Provide wall mounted PTAC heat/air conditioning units as required per plans.
 - 10) Provide in each room an emergency combination exit/flood light with battery back-up. Also provide exterior emergency light with remote heads.
 - 11) Provide (2) wall mount exterior lights with photocell
- 2. Provide fire extinguishers at each exit door (2) total.
- 3. PRESSBOX FIELD SOUND SYSTEM:
 - A. Furnish and install a sound box equivalent to the Sportsound 500HD System as manufactured by Daktronics Inc., 201 Daktronics Drive, Brookings, SD 57006.
 - Contact: MicSpicciati, 410-320-0703, Mic.Spicciati@daktronics.com.
 - C. AUDIO CONTROL SYSTEM
 - 1. Sportsound Rack 100 (SSR-100) that includes:
 - a. 10 Channel analog mixer
 - b. Input/output panel for easy plug and play operation
 - c. XLR cables
 - d. Laptop/MP3 interface unit
 - 2. Wireless Microphone Handheld Package that includes:
 - a. Wireless Receiver
 - b. Handheld transmitter with SM58 mic
 - c. Power Supply
 - d. ½ wave antennas
 - e. Rack mount kit
 - f. Accessory Bag and AA Batteries
 - 3. Sportsound Ammouncers Mixer (SSR-AM) that includes:
 - a. 2 Channel Tabletop
 - b. Microphone and MP3 inputs
 - c. Single-Muff Headset
 - d. 1/8" to 1/8" stereo cable
 - e. XLR Cable
 - 4. Fiber Conversion Box with Analog Backup
 - D. CABLE AND CONTROL WIRING
 - 1. All cables must be installed in conduit or closed raceway areas. Use plenum

cable as necessary. Exposed cable is not acceptable. Cable specifications area as follows: Microphone level cables: No. 22 shielded jacketed – Belden 9451 with black jacket.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. All work performed by technicians experienced in bleacher seating. Project references may be required to verify the quality of finished projects.
- B. Installation with proven experience in the northeast region. Requirement for a minimum of (3) installer references in for this project of similar size and scope.
- C. Project is only to be installed as per approved shop drawings.

3.02 EXAMINATION

- A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.03 ERECTION

- A. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- B. Do not field cut or alter structural members without approval.

3.04 CLEAN-UP

- A. Clean up all debris caused by work of this section removed from site.
- B. Upon completion of the work and final inspections, bleacher manufacturer installer shall broom clean the stand removing all loose debris.

END OF SECTION 131250